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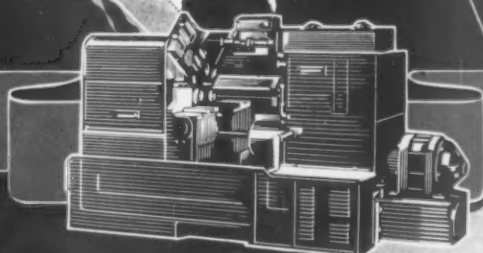
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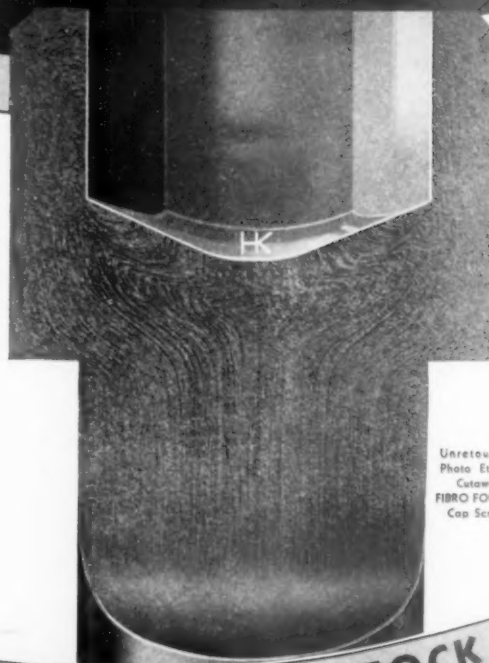
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THE TOOL ENGINEER

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IDEA EXCHANGE

"The Crib" begins as a regular feature in this issue of The TOOL ENGINEER. It will be stocked with practical ideas, kinks, and shop shortcuts—proved in production. Perhaps you have solved a tricky engineering problem that a brother Tool Engineer across the country is scratching his head over. Send it to us! If it is used in "The Crib", a check for five dollars is yours. Turn to page 162.

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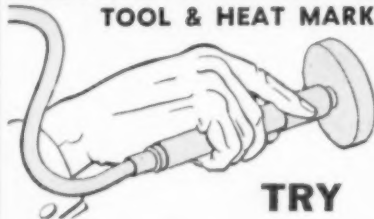
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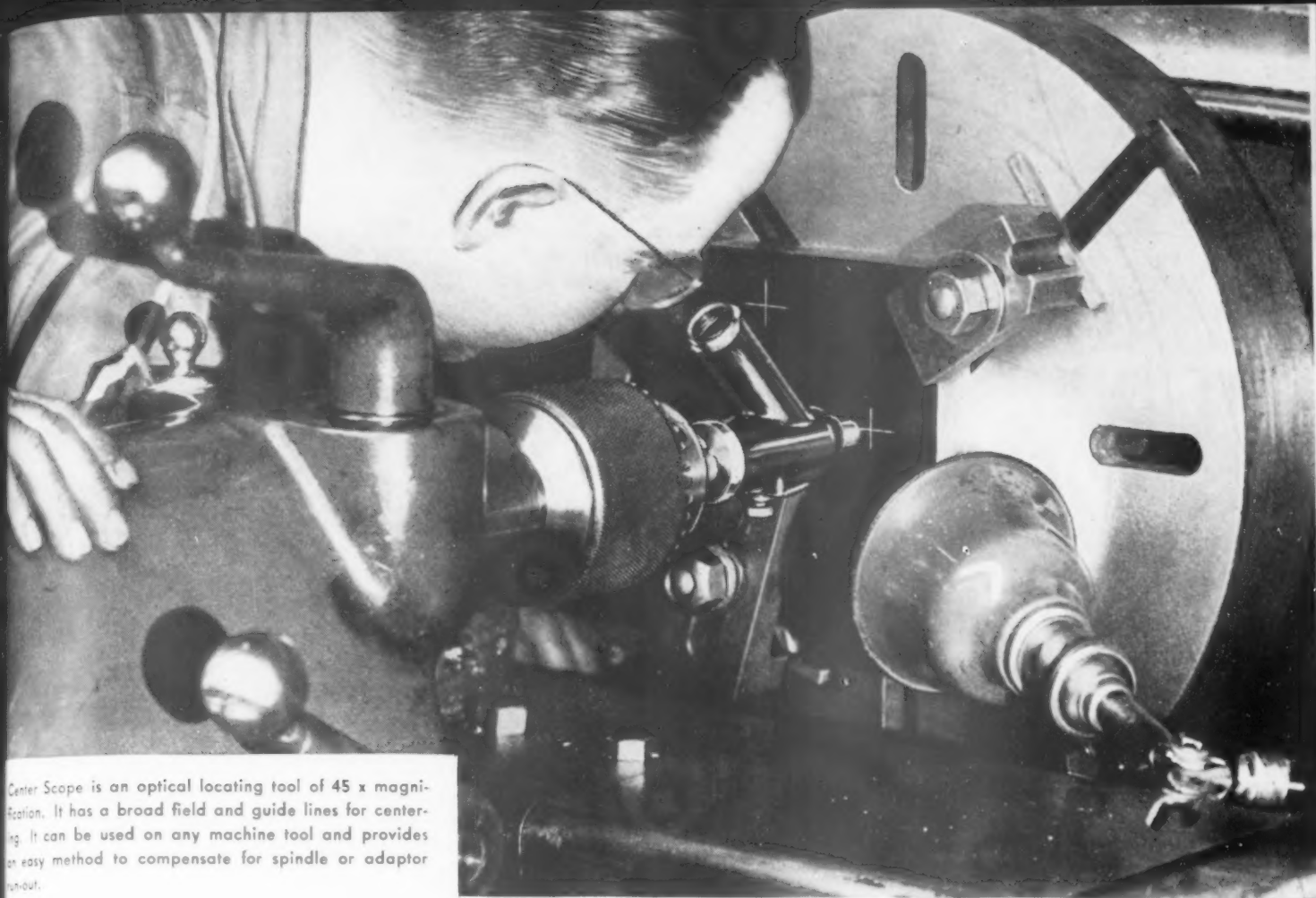
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THE TOOL ENGINEER



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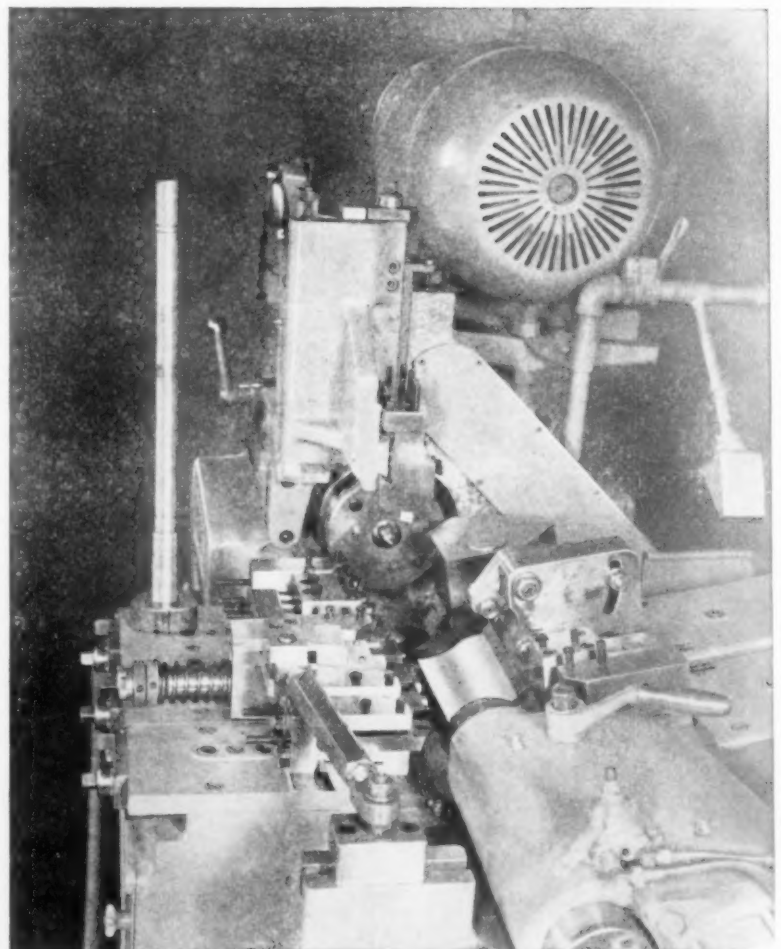
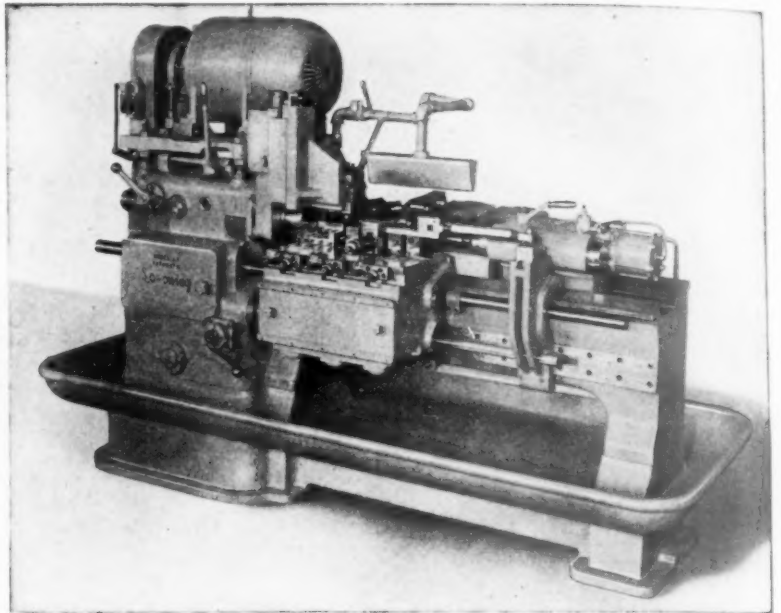
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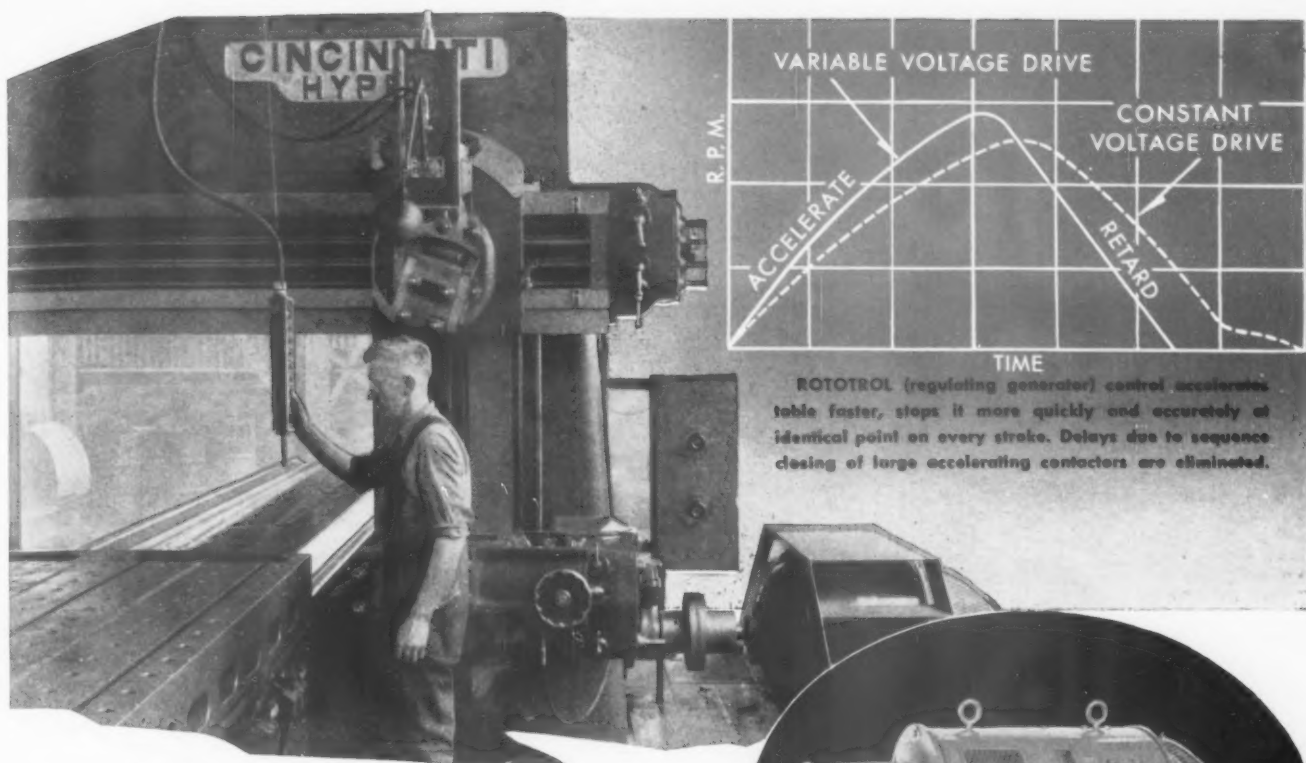
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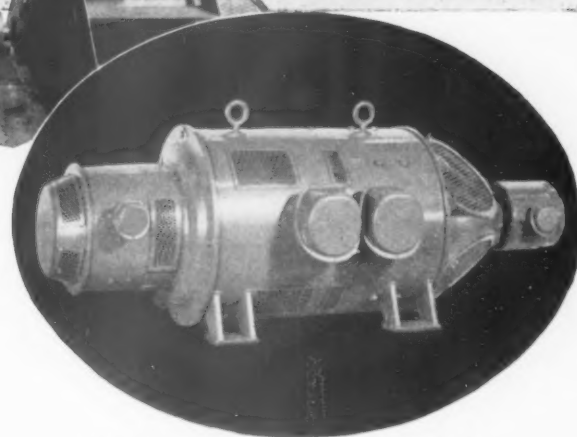
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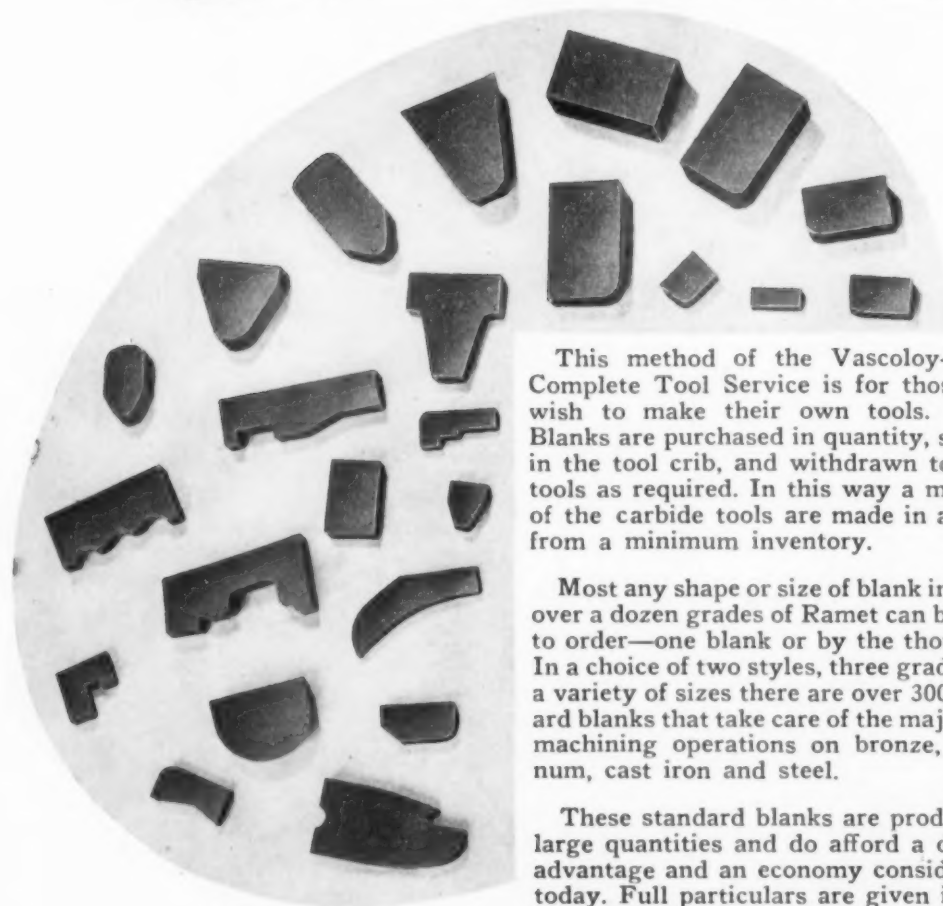
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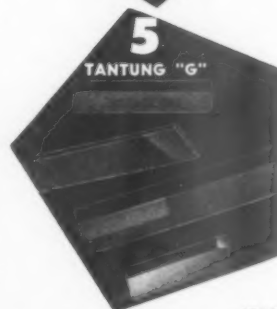
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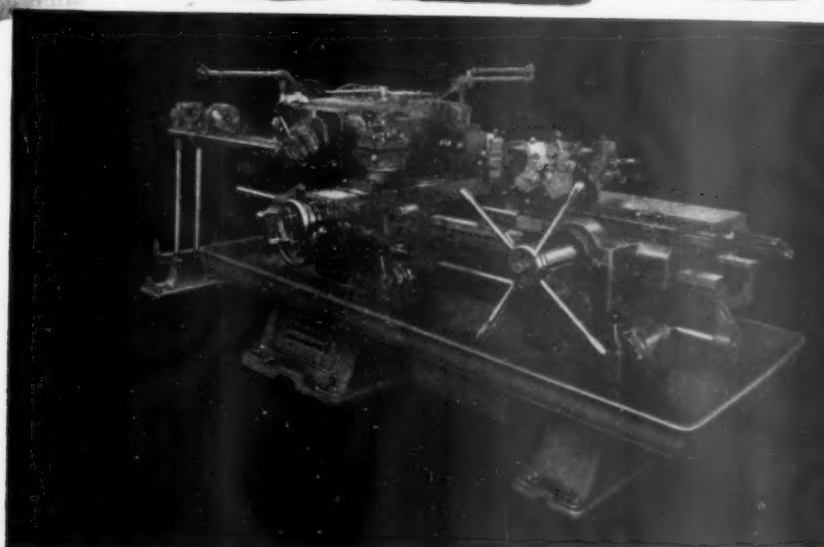
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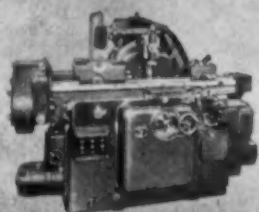


LIKE many an early leader in the machine tool field, David H. Hilliard received his training in the Vermont shop, of which Jones & Lamson Machine Company is a direct successor. When war broke out in 1861, Hilliard worked night and day to complete a wagon load of heavy telescopic rifles. These he drove to Concord and presented to the Governor of New Hampshire to arm a picked company of Sharpshooters.

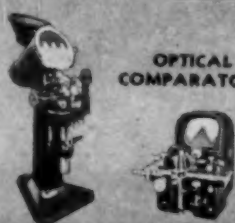


No. 3 Jones & Lamson Ram Type Universal Turret Lathe with standard bar equipment.

AUTOMATIC THREAD GRINDERS



OPTICAL COMPARATORS



RAM TYPE UNIVERSAL TURRET LATHE



FOR A WAGON LOAD OF RIFLES

IN 1861 a wagonload of rifles was a major contribution to national defense. In 1941 it might help some, but it wouldn't help enough.

Yet on the vast scale in which the fate of the world is being weighed today, one of the heaviest contributions to the survival of freedom is an intangible contribution, and it comes from the same original sources as Hilliard's wagonload of small arms.

This contribution consists of the skill, experience and adaptability of a machine tool engineering and precision manufacturing organization whose continuous development began with Hilliard's predecessors over a century ago. Continued in turn by men like Hubbard,

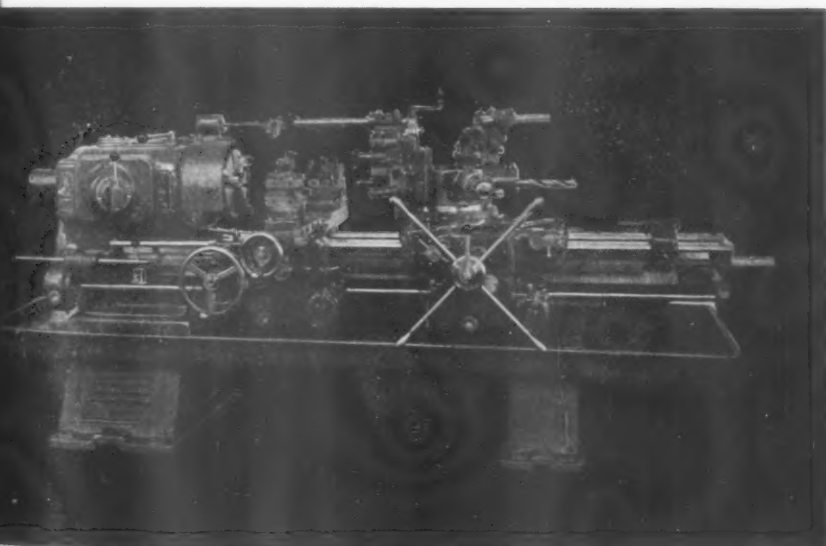
Kendall, Robbins, Lawrence, Howe and Hartness, this unbroken progress makes Jones & Lamson machine tool technique available to you in its present high speed, modern form.

With Jones & Lamson equipment you can speed war time production now, and with it later you will be in position to earn a living profit in the hard years ahead.

That's why it pays to put production problems up to Jones & Lamson engineers. That's why it is so advantageous to be Jones & Lamson equipped. Illustrated catalogs of this equipment are available, and inquiries from large plants or small receive careful study here.

JONES & LAMSON

MACHINE COMPANY, Springfield, Vermont, U. S. A.

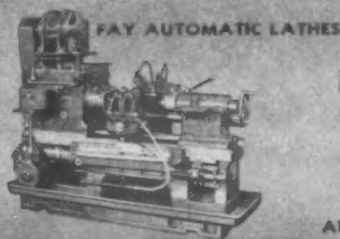


7A Jones & Lamson Saddle Type Universal Turret Lathe with standard chucking equipment.

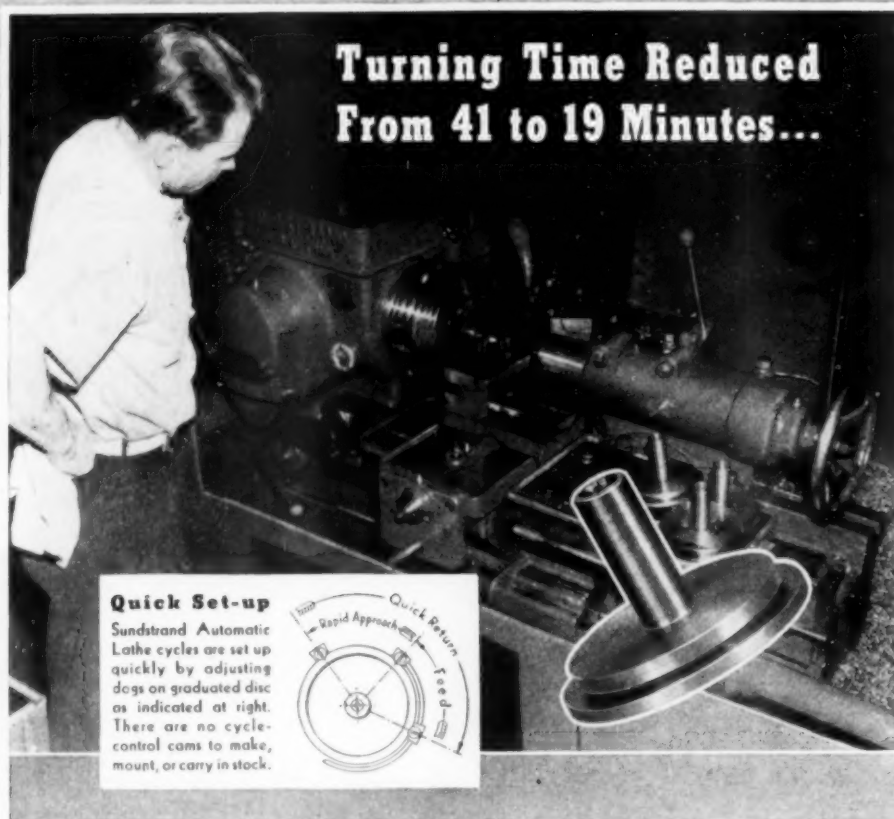
Manufacturers of Ram & Saddle Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Thread Grinding Machines . . . Comparators . . . Automatic Opening Threading Dies and Chasers



**PROFIT PRODUCING
MACHINE TOOLS**



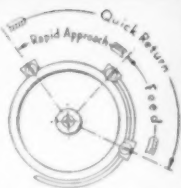
Engineered Production



**Turning Time Reduced
From 41 to 19 Minutes...**

Quick Set-up

Sundstrand Automatic Lathe cycles are set up quickly by adjusting dogs on graduated disc as indicated at right. There are no cycle-control cams to make, mount, or carry in stock.



...At A Time When Even Seconds Count

In the Miscellaneous Shaft Department at a large airplane engine plant, Sundstrand Automatic Lathes are saving precious minutes on many turning operations... at a time when every second has extra value. They frequently double former production, always make operator's work easier.

For Example... Three operations on pump drive shaft shown above formerly required 41 minutes and operator's full time. On Sundstrand Automatic Lathe illustrated, same three operations now require only 19 minutes. Twenty-two minutes are saved, production is increased 116%, and operator can do other work while lathe runs through its automatic cycles. When photographed, shaft shown was being processed in lots of 200. Other

shaft parts, in lots as small as 50 each, are turned on Sundstrand Automatic Lathes in this department with similar savings.

Here's Why... Sundstrand Automatic Lathes make big time-savings and production-increases because they have fast automatic cycles, multiple tooling, wide ranges of speeds and feeds. They are easily set up, can be changed from one average job to another in 20 to 25 minutes. See diagram above for one reason; see book shown at right for many others.

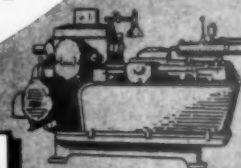
Investigate... See how Sundstrand Automatic Lathes can save time and increase production on your turning. Send us drawings with data and we'll give you Engineered Production proposals.

Sundstrand Machine Tool Co.
2532 Eleventh Street, Rockford, Illinois, U. S. A.

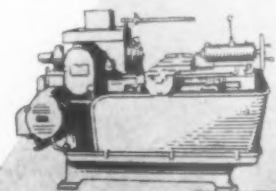
Model 8
Automatic
Stub Lathe



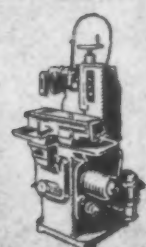
Model 10
Automatic
Stub Lathe



Model 12
Automatic
Stub Lathe



In their respective fields, Sundstrand machine tools are unexcelled for high production, accuracy, and lasting value. Write for complete details.



No. 00 Rigidmil



No. 0 Rigidmil

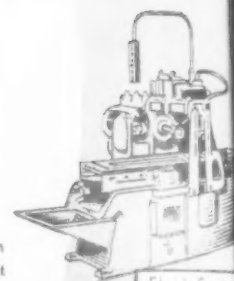


No. 1 Rigidmil

Get This Book ↓



Especially useful to men engaged in new work that involves turning, book T5-391 gives complete information about Sundstrand Automatic Lathes. Write for your copy, today.

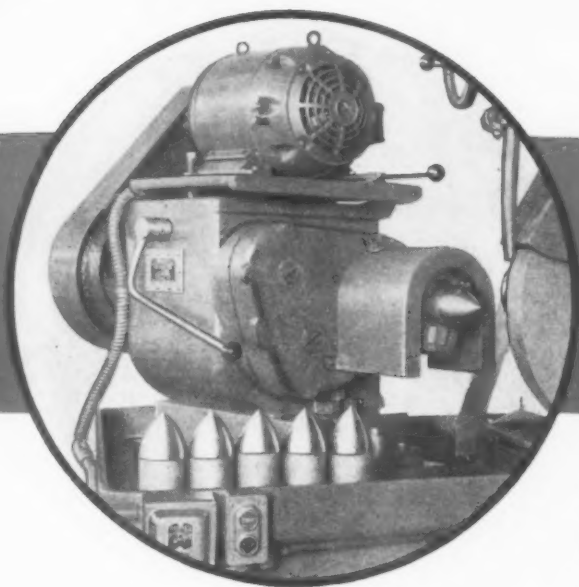


Fluid-Screw
Rigidmil



RIGIDMILS · STUB LATHES

Hydraulic Operating Equipment — Drilling and Centering Machines



*on Grinding
jobs like this*

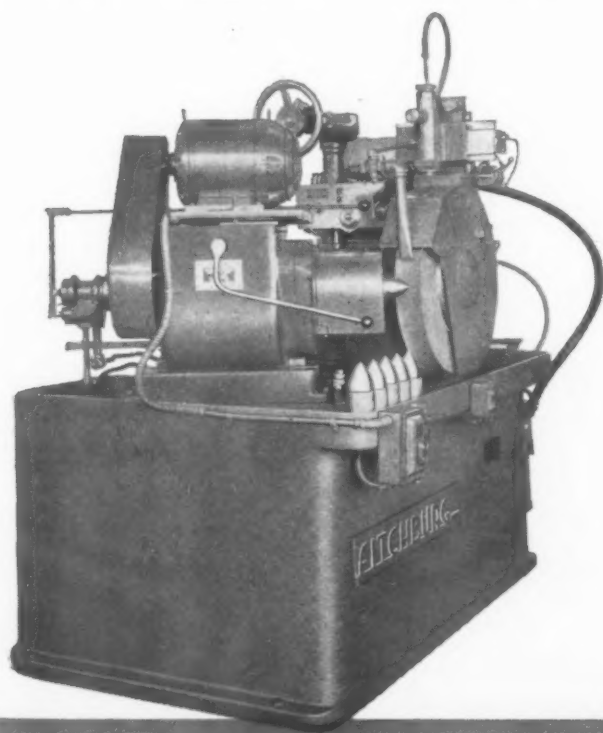
... FITCHBURG OFFERS SPECIAL ADVANTAGES IN MASS PRODUCTION

This Fitchburg special Chucking Grinder with a heavy duty headstock, is designed for grinding the oive of armour piercing shells. The wheelhead is a Fitchburg Standard Bowgage Unit carrying a

24" x 3 1/2" face wheel. A hydraulic form trueing device is mounted on the wheelhead.

To operate this machine the operator places the shell in the open jaw chuck, then, by pushing a ball lever forward, closes the chuck, clamping the work piece at a definite distance from the bottom of the shell. To start the work rotation, operator depresses the long lever and pushes the button to start the automatic grinding cycle.

When installing special precision grinding equipment, it is well to remember that the Fitchburg Bowgage Grinding Wheelhead is a standard unit. It can be remounted on standard machines, or on new special bases, for operations other than the one originally specified. This feature protects your investment.



*... Write today
for folder giving
complete details.*



FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U.S.A.

Manufacturers of — Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders.

Lick Your Contour Grinding Jobs with your present HEALD INTERNAL

- ★ SIMPLY
- ★ QUICKLY
- ★ INEXPENSIVELY

A truing device can be readily attached to your Heald No. 72A Plain Internal and will permit immediate production on plunge-cut contour grinding jobs, including cartridge dies, etc.

This attachment consists of a serrated surface plate with a fixed cam mounted on a bracket attached to the front of the machine and a holder carrying the truing diamond and a cam follower which is movable by hand on the surface plate.

By following the cam with the diamond holder the wheel can be trued to exactly the same shape, thus permitting plunge grinding the work to the required contour.

Compensation for wheel wear and truing is provided by means of a knob on the device. Cams are interchangeable, too, and the surface plate adjustable in the bracket T-slot.

Wheels having a wide range of shapes and sizes can therefore be trued for grinding all kinds of contour work.

Contact us at Worcester or one of our branch offices in your locality for details.

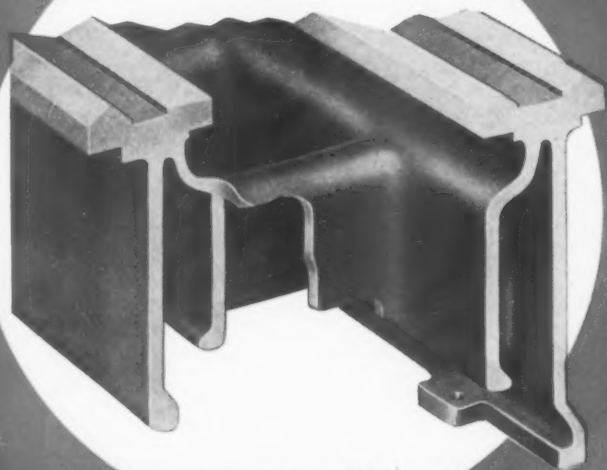


By means of the contour truing attachment furnished on this Heald No. 72A Plain Internal form wheels for plunge contour grinding various types of cartridge dies can be easily and quickly trued to the exact shapes desired.

THE HEALD MACHINE CO. WORCESTER, MASS. U. S. A.

STURDY *from the Base up ...*

Sidney Lathes

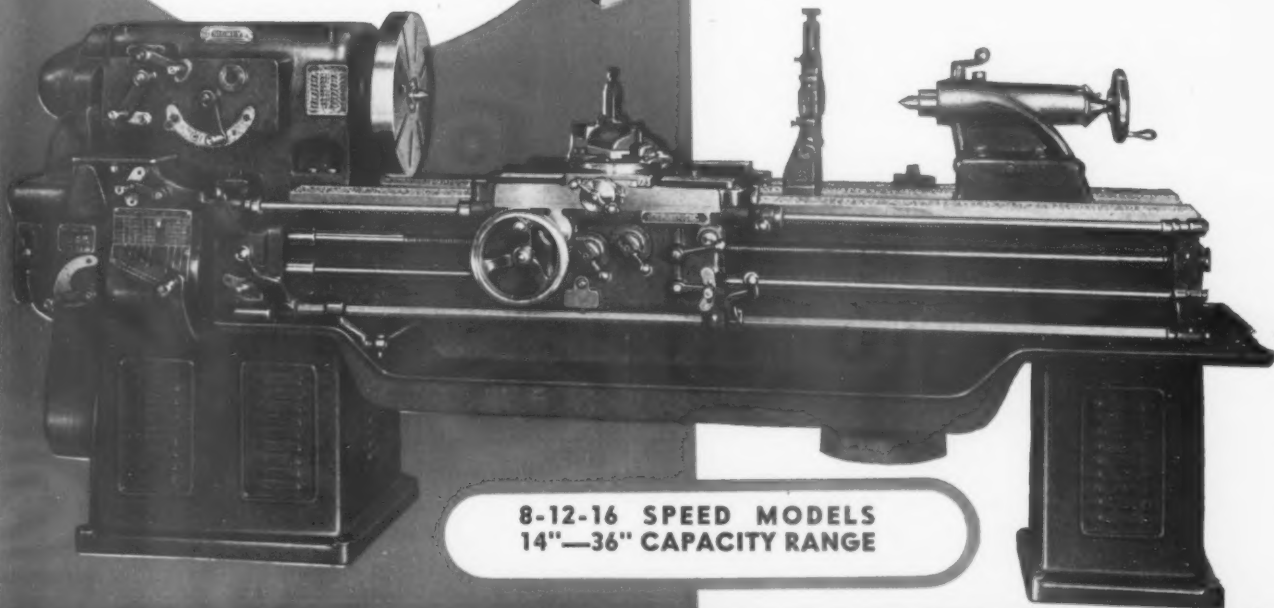


Sound engineering from the base up results in a superb machine tool with several outstanding features which definitely improve production and assure dependable accuracy over a long span of profitable years.

RIGID BED CONSTRUCTION

One of these features is the Bed of the Sidney Lathe. Four longitudinal walls (as illustrated) with cross girts at 12" intervals resist deflection and twisting strains. This type of bed supporting the various units of the lathe is essential to eliminate vibration and assure continued accuracy.

Complete details described and illustrated in available bulletin.

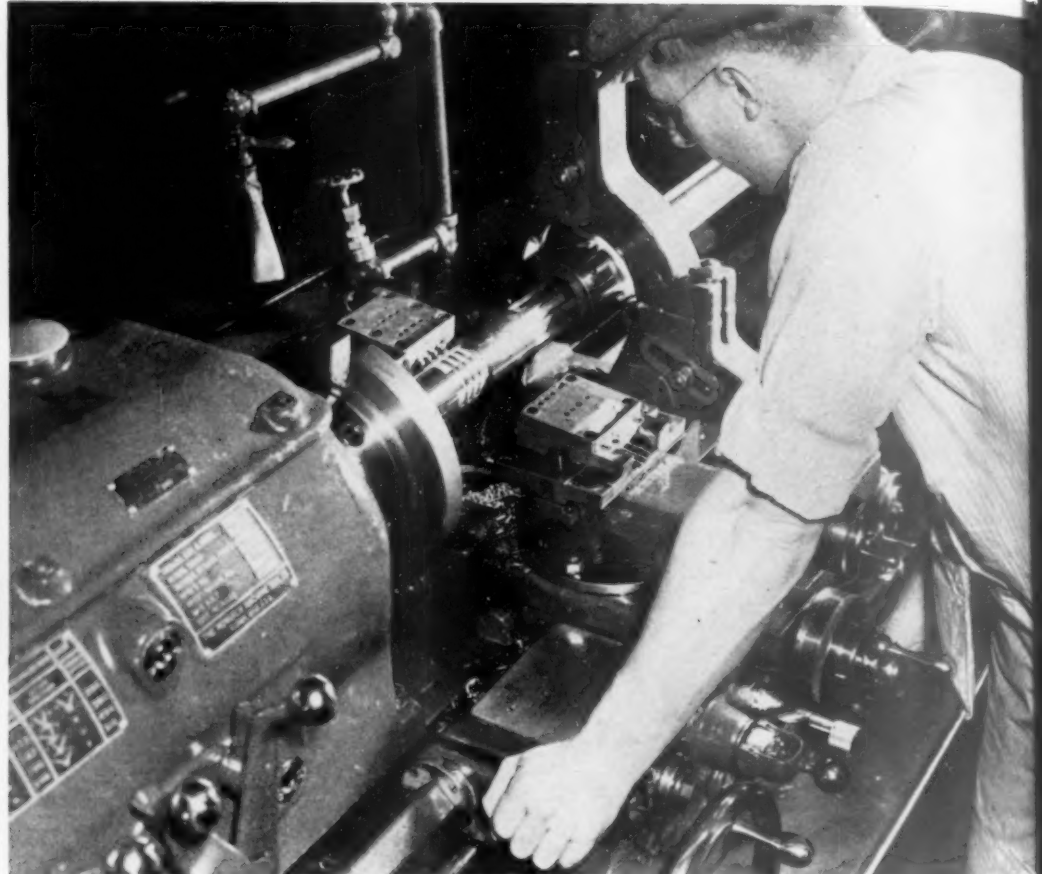
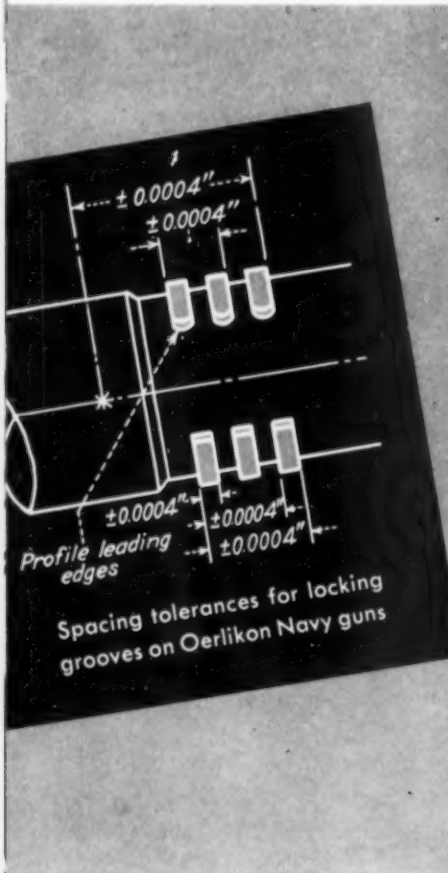


8-12-16 SPEED MODELS
14"—36" CAPACITY RANGE

The **SIDNEY MACHINE TOOL Company**
SIDNEY **U.S.A.** **OHIO**

Formula

FOR ACCURACY ON OERLIKON GUNS



Two interchangeable barrels are required for each Navy Oerlikon gun being built by a large automotive manufacturer. To lock properly in the breech casing, each barrel has three interlocking grooves, which must be turned to accuracy limits of 0.0008". Actually, the work is produced within 0.0004".

Steps in the operation consist of:

1. Milling interruptions before grooving to prevent heavy burr being thrown up between grooves. Also, since grooving chips are no longer than the length of the groove, they cannot carry around with the work.
2. Turning grooves on a Monarch 16" x 78" Model W Lathe. This is equipped with a special cross slide which mounts front and rear tool blocks and feeds to positive stops. Tools are fitted tightly into blocks, with hardened spacers to maintain accuracy.

Tools are purchased 0.001" oversize for width and are lapped to half a tenth in the plant toolroom, with extreme care to maintain size and clearance angles, with keen edges free from minute nicks. Tool setting is checked with master gage to a 0.0002" limit for spacing and cumulative errors.

After tool blocks and positive stops are set, the work becomes almost completely automatic on this type of Monarch Lathe. This is the same basic design which is used extensively in the automobile industry for piston grooving, and that has proved its worth for so many years in its accuracy and unflinching performance.

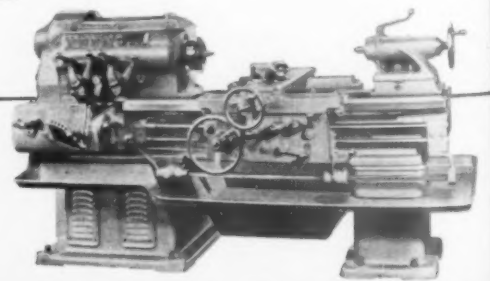
Again, we point out that regardless of increase in the production of Monarch Lathes for war implement use, we tolerate no letdown in the quality which has earned Monarch's reputation.

THE MONARCH MACHINE TOOL COMPANY . . . SIDNEY • OHIO

MONARCH



LATHES

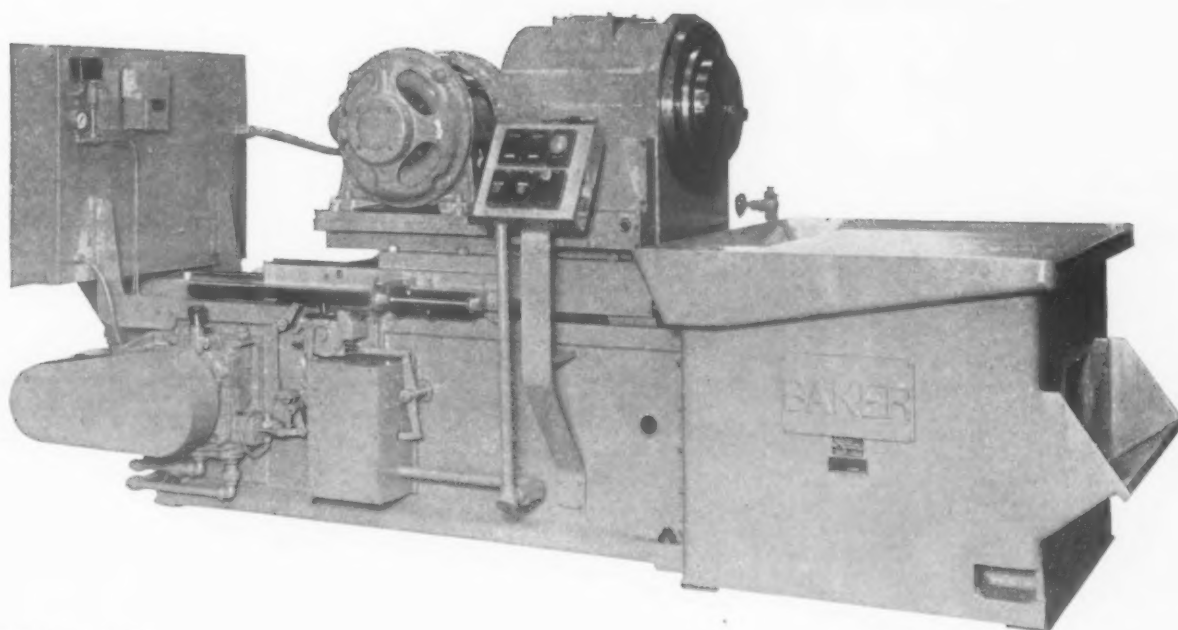


Whether the job requires power, speed, accuracy or sta-

COVER THE TURNING FIELD

BAKER

HORIZONTAL HEAVY DUTY DRILLING AND BORING MACHINE



IN USE ---

This type of machine is in successful operation for drilling from solid and rough boring in airplane propeller hub manufacturing plants, for horizontal drilling and boring operations in landing gear parts, and for heavy duty drilling and boring in gun breech ring forgings.

FEATURES ---

Hydraulic feed floor type unit, automatic in its cycle, with push button control. The saddle is mounted on four nitralloy bars with X-alloy bushings which insures longer life because it eliminates chip scoring. The single spindle head unit is mounted on the saddle. The final drive is to a very large size spindle with preloaded ball bearings through means of enveloping cone type worm and worm gears. The standard machine is furnished with two quick changes of speed, and, if the head is driven from a two-speed motor there are four quick changes of speed. The spindle driving end is flanged, allowing for the mounting of large diameter facing cutter heads.

WRITE FOR NEW CIRCULAR AND ENGINEERING DATA SHEET

BAKER BROTHERS, INC. TOLEDO, OHIO, U. S. A.

DRILLING - BORING - TAPPING - KEYSEATING - CONTOUR GRINDING MACHINES

Six Time and Money Saving Reasons Why It Will Pay You To Install SUNNEN PRECISION HONING

- 1. Inexpensive . . .** The basic price of the Sunnen Precision Honing Machine is only \$195. Operating costs are correspondingly low.
- 2. Accurate — Super-Smooth Finish . . .** Accuracy within .0001" is guaranteed — has often been held to .000025" in production work. Finish often held to 2 to 3 micro inches.
- 3. Does Not Require Skilled Labor . . .** Workers in "teens" can handle jobs in "tenths" after a few hours' instruction and practice. In many plants Sunnen Hones are operated by girls.
- 4. Relieves Big Internal Grinders . . .** Range of .185" to 2.400" makes it possible to handle many important small jobs which in the past had to be run on large internal grinders.
- 5. Doesn't Need Fixtures . . .** Work is held in hand by operator — no fixtures necessary.
- 6. No Set-Up Time . . .** Machine can be set up for any job within its size range in less than one minute. Size adjustment can be made with machine in motion and work on mandrel.



**Write for FREE
BULLETIN**

WRITE for Free Bulletin giving complete data. Or, if you prefer, a Sales Engineer will call and demonstrate machine in your plant on your job.

★ Manufacturers throughout the war industries are amazed to find that such an inexpensive machine can produce such accurate work at so low a cost.

In our constant effort for more and MORE PRODUCTION of vital war materials, the Sunnen Precision Honing Machine is playing an important part. In plant after plant it is showing production increases of from 100% to 500% with corresponding reduction in costs.

Corrects errors of out-of-roundness and taper caused by previous operations. Finishes holes to close tolerances both as to size and straightness. Maintains alignment established by previous operations. Provides simple, low cost method for duplicating sizes.

Put Sunnen Precision Honing to work in your plant.

SUNNEN PRODUCTS COMPANY

7932 Manchester Avenue St. Louis, Missouri

Canadian Factory: Chatham, Ontario

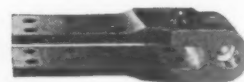
SUNNEN



Aluminum Aircraft Link "produces high finish without bell-mouthing."



Better finish and alignment maintained on yoke for compressor.



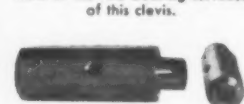
Mild Steel Clevis Honing was used to correct errors of previous machining and maintain true alignment of the two bearing surfaces of this clevis.



Hardened Steel Inner Bearing Race honed to .00005" limit. Surface finish improved; errors of out-of-roundness eliminated.



Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.



Diesel Engine Fuel Injector Cylinder "So accurate that a piston can be fit within .00005 inch."

NEW HORIZONS

FORWARD-LOOKING manufacturers, because of thorough research and experience in their particular fields, can aid in establishing a better social and economic order in more ways than by providing machinery and merchandise. That is why Continental Machines, Inc. deal out fresh ideas and usable information every little while.

MACHINES CREATE EMPLOYMENT

During the gray days of the past decade, many people believed that machines were one of the chief causes of unemployment. In 1939 Continental published "Machines and Progress", a panoramic wall chart 5 feet long and 2 feet high, matching mechanical development through the years with employment figures. This study shows that machines are in reality the stepladders to higher standards of living. There are still a few of these charts on hand, if you'd like to have one.

STIMULATING YOUNG MEN'S INTEREST

Before there was too great a scarcity of mechanics and tool makers, Continental made a bold bid to young men everywhere to swap their frayed white collars for honest, money-making overalls. They published "12 Easy Lessons In Machine Shop Practice". This illustrated study course was distributed to schools, Y.M.C.A.'s, Boys Clubs, and hung in factories from coast to coast. It became so popular that it had to be reprinted this year. Would you like a copy?

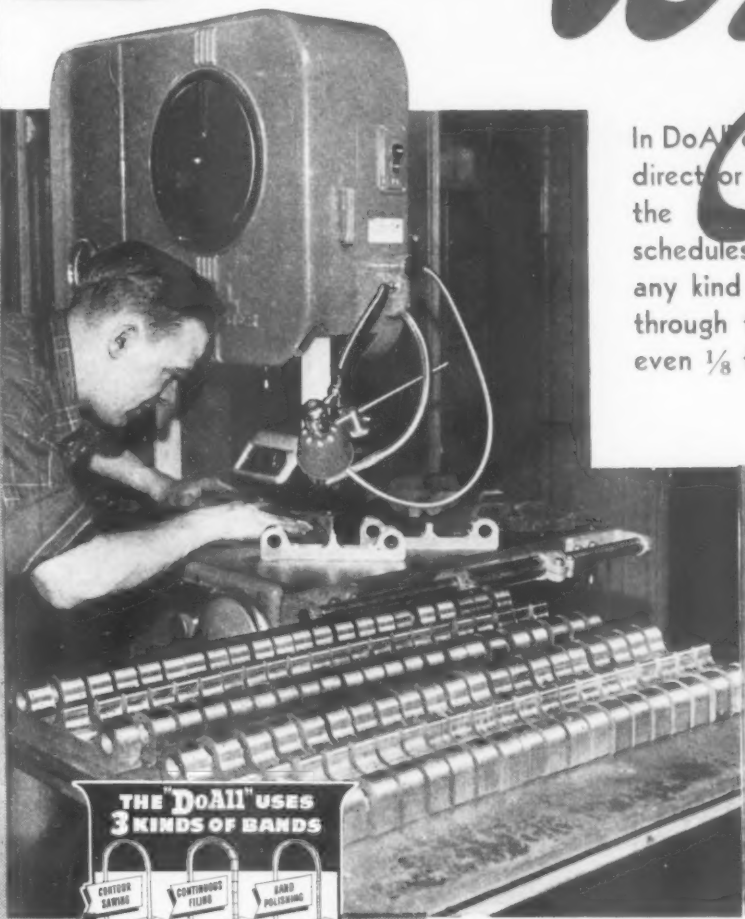
FREE TRAINING COURSES

The DoAll Trade School, Minneapolis, gives Free training in the use of DoAll Contour Machines, Surface Grinders, Lathes, Shapers, Milling Machines, etc. Into a short course are packed 200 to 500 hours of actual shop work, lectures, movies, experiments with new metals, etc. Sixty students are graduated and placed in industry every month. If you know a young man who wants to learn how to do a multitude of jobs faster and better, send for application blank. Or, it may be that you can use one of the School's graduates in your plant.

CUTTING COSTS

A brand new book of few words and loads of illustrations, prepared in a snappy, Chalk Talk style that won't let you put it down until you reach Page 48 and the last one of the "40 Ways To Cut Machining Costs." Let us send you a copy.

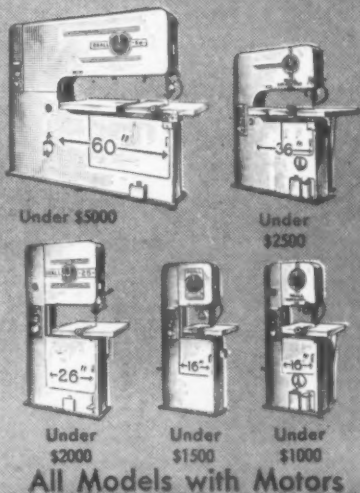
DoAll PRODUCTION Wizard



In DoAll equipped plants, war orders on direct or sub-contracts are coming off the assembly lines far ahead of schedules. Products or parts made from any kind of metal or alloy are shoved through to completion in $\frac{1}{2}$, $\frac{1}{4}$ and even $\frac{1}{8}$ former time.



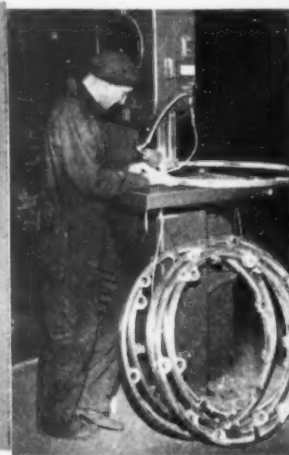
THE EXACT SIZE FOR YOUR JOB



All Models with Motors

Left — Production work on Swedish steel 1" thick. A much improved and faster method over shaping or milling.

Right — Internal finishing of large brass collector rings.



DoAll Aim

To shorten the war and get back to peace-time work on everything American from automobiles to lawn sprinklers. DoAlls offer the fastest precision method to remove metal.

They relieve \$5,000 to \$50,000 machine tools of over-load work and have become absolute *musts* in every modern plant.

BETTER INVESTIGATE

Let us send a factory-trained production man to your plant with a DoAll to show you how it can short-cut your orders to completion.



Steel alloy aircraft tubing cutoff production for airplane motor mounting frame work. New war-time job for this firm.

CONTINENTAL MACHINES, INC.

1704 S. Washington Ave., Minneapolis, Minn.

Associated with the DoAll Company, Des Moines, IA.

Also Dealers of Band Saws and Band Files for DoAll Contour Machines.

NEW BOOK

"DoAll in Production" — 40 pages of DoAll in work all over the country. Prepared for quick reading by this firm. Send for copy.

How a Big Wartime Manufacturer uses his Jobber to keep materials coming in—and recorded

Those Manufacturers who through the years have become really acquainted with their Industrial Distributors, have fared best in getting their War production up to top speed in the shortest time.

Here is the case of an established Com-

pany building, equipping and starting production in a huge new plant—

And the priceless co-operation by his Mill Supply Distributor in establishing an orderly Stockroom when some other Departments were still in confusion:—

ORDERING MATERIAL & SUPPLIES



One copy of each requisition for materials or equipment bought through the Industrial Supply Distributor goes to the salesman as his personal record of each transaction.

CHECKING INCOMING SHIPMENTS



Incoming deliveries of materials requisitioned through the Industrial Distributor are checked upon arrival. The salesman helps with the checking if desired.

STOCK-KEEPING INSIDE PLANT



Distributor's salesmen kept a friendly eye on supplies and helped the Stockkeeper to avoid shortages. *Your* Distributors' men will render this valuable service, too.

Whether *you* need help in the Stockroom or elsewhere, your Distributor's resourceful salesmen know their way around and doubtless can do some other equally valuable job for you.

They deserve *your* complete confidence—they earned *ours* long ago. Cle-Forge High-Speed Drills and Peerless Reamers are marketed through Mill Supply Houses throughout Industrial America.

The CLEVELAND **TWIST DRILL COMPANY**
TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES
30 READE ST. NEW YORK 9 NORTH JEFFERSON ST. CHICAGO 650 HOWARD ST. SAN FRANCISCO
6515 SECOND BLVD. DETROIT LONDON - E. P. BARRUS, LTD. - 35-36-37 UPPER THAMES ST. E.C.4



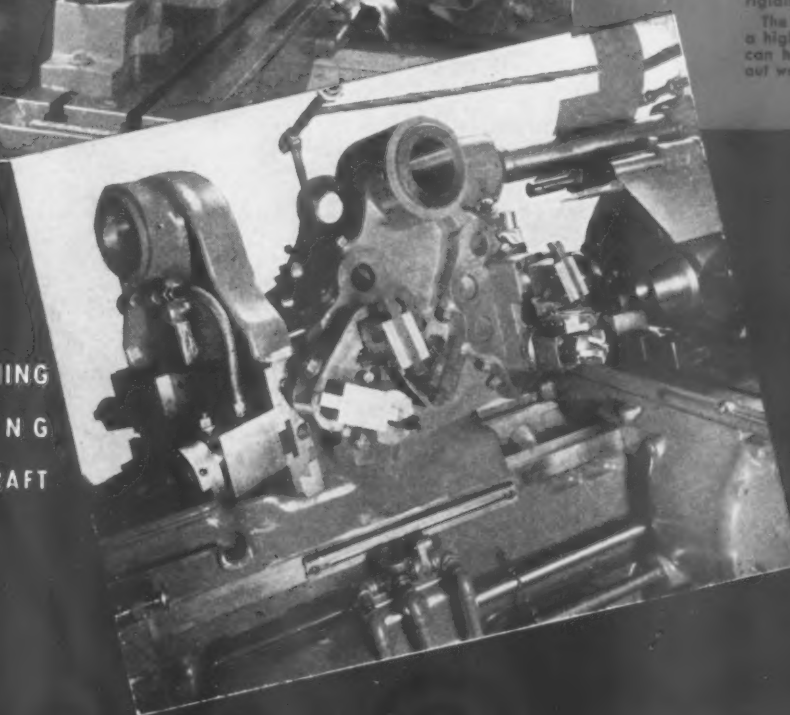
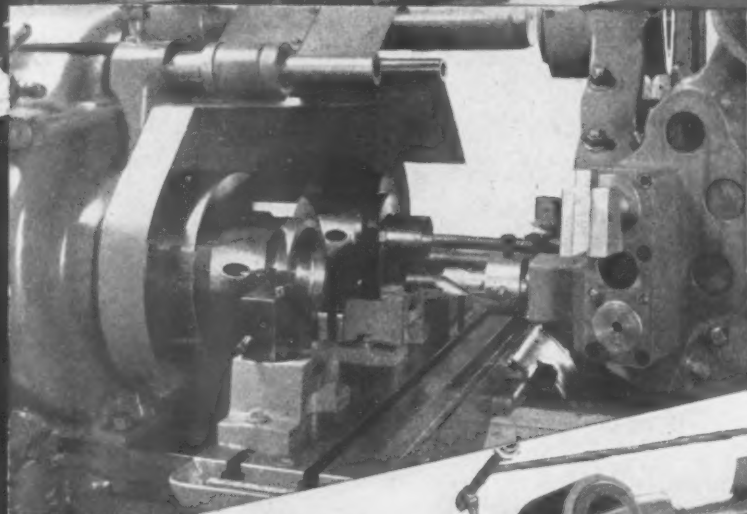
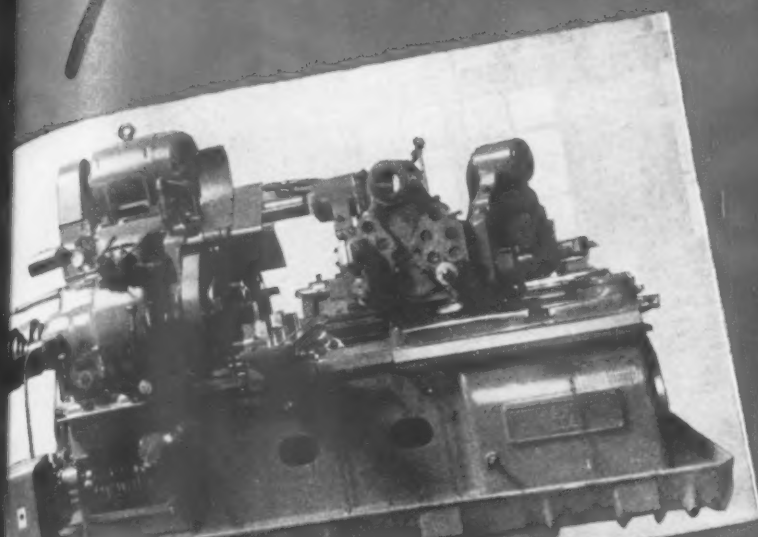
"CLEVELAND" DISTRIBUTORS EVERYWHERE ARE READY TO SERVE YOU



Results

FROM PLANNED PRODUCTION ON

5-DTWO SPINDLE AUTOMATIC CHUCKING & TURNING MACHINES



*
COMPLETE FINISHING
OF OPERATING
GEARS FOR AIRCRAFT
PROPELLERS—

For work within its range, this P&J machine offers an output from two spindles in a floor space equivalent to that required by a single spindle unit. Then, too, savings in power and initial investment are realized as compared with two single spindle machines.

The gear for operating Curtiss-Wright variable pitch propeller—a steel drop forging—is machined in four holdings with two opposite-face roughing operations being performed simultaneously. It is then heat treated and the second two finishing operations are handled during the same cycle.

A cross slide unit operates in conjunction with the turret slide, providing for rough and finish facing cuts and operation of slide tools mounted on turret. Design of overhead pilot, standard on this machine, assures an effective tie between headstock and turret slide. The illustrations show clearly the rigidity and simplicity of the tooling.

The gear blank being machined—an aircraft part—requires a high degree of both accuracy and finish. Yet one operator can handle three P&J Two Spindle machines and easily turn out work to exact specifications.

DETAILS OF OPERATIONS

The first and second roughing operations are performed simultaneously on rear and front spindles. Large open end of blank is presented to rear spindle with grip on O.D. Small end of blank is presented to front spindle and gripped on portion of O.D. machined on rear spindle. Operations on the two spindles include spot drilling hole, drilling hole, rough turning O.D., rough facing, semi-finishing and finishing small gear diameter and bore of large gear diameter.

After machining all over as above, the parts are heat treated before simultaneously finishing on rear and front spindles with large and small ends presented to spindles as in the rough operations.

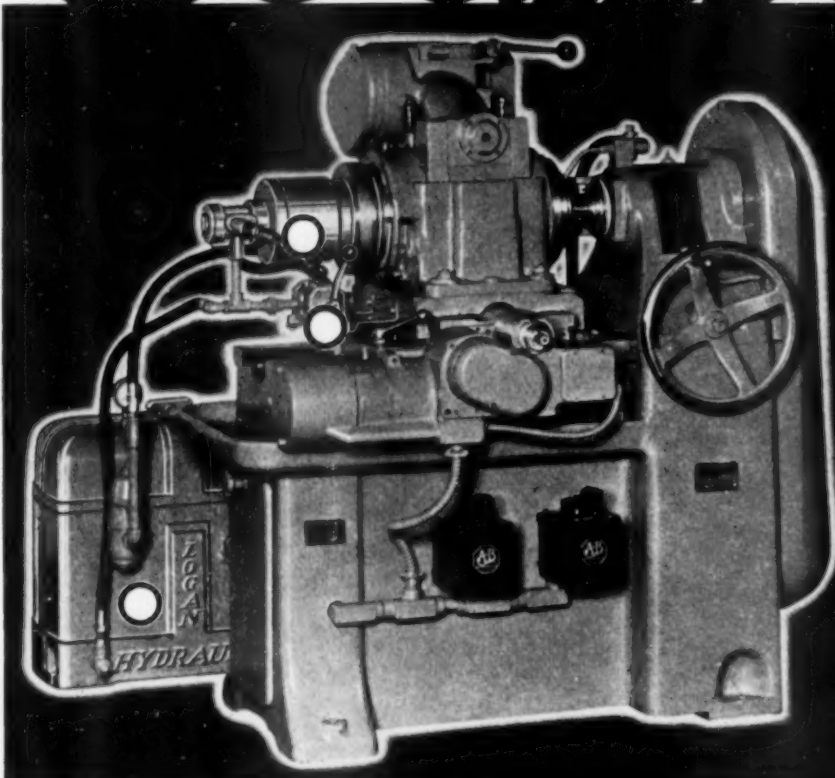
Complete information as to details of operations, speeds and feeds is available on request.

POTTER & JOHNSTON MACHINE CO

PAWTUCKET

RHODE ISLAND

“LOGAN”



HYDRAULIC

EQUIPMENT



AS APPLIED TO LEES-BRADNER

AUTOMATIC CHUCKING THREAD MILLER

**“LOGAN” Model “HR”
Hydraulic Cylinder**

**“LOGAN” Model 5022
Hydraulic Power Unit**

**“LOGAN” Model 4095
Hydraulic
Control Valve**

**“LOGAN” Sure Flow
Coolant Pump**



“LOGAN” equipment consists of—(1.) A “LOGAN” Hydraulic Power Unit as an entirely independent source of fluid power supply, assuring constant pressure for the continuous and efficient operation of the “LOGAN” Hydraulic Cylinder. (2.) A “LOGAN” Rotating Hydraulic Cylinder is used to actuate a collet chuck, which holds the item to be threaded. (3.) A “LOGAN” 4095 Balanced Four Way Piston Type, Hand Operated Valve controls the action of the hydraulic cylinder. (4) Coolant is supplied by a “LOGAN” Sure Flow Pump mounted to the back of the machine. “LOGAN” Representatives and Engineers will be glad to make recommendations on your hydraulic problems.



LOGANSPORT MACHINE, INCORPORATED

902 PAYSON ROAD

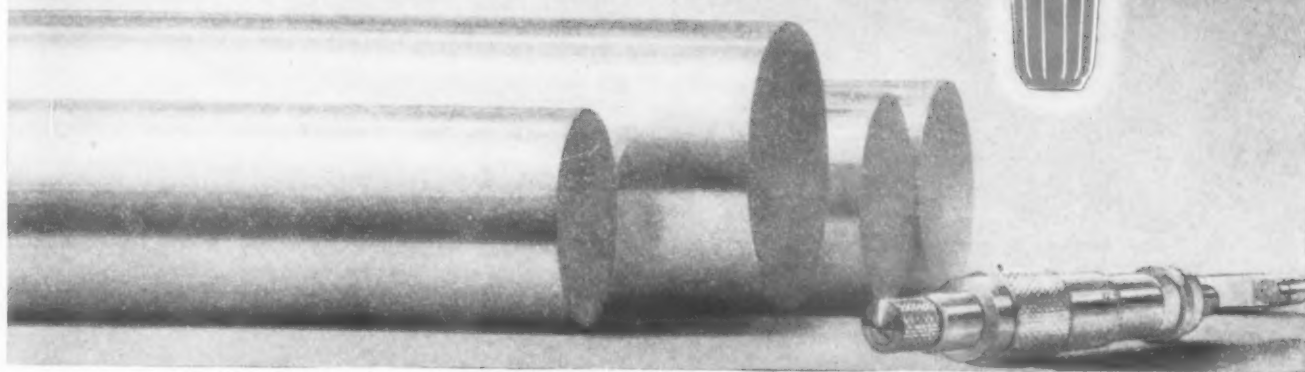
Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders, Valves, Presses and Accessories

LOGANSPORT, INDIANA



NITRALLOY STEELS

*- - prolong the life of
WAR EQUIPMENT*



The well known wear-resisting qualities of the extremely hard surfaces obtainable with Nitalloy Steels have made Nitalloy essential for parts for tanks, planes, ships, guns and other war equipment. We are producing Nitalloy Steels hot rolled, annealed or heat-treated—turned or centerless ground.

COPPERWELD STEEL COMPANY WARREN, OHIO

ARISTOLOY STEELS

CARBON TOOL STEELS · ALLOY TOOL STEELS

AIRCRAFT QUALITY STEELS · STAINLESS STEELS

NITRALLOY STEELS · BEARING QUALITY STEELS

IT'S UP TO YOU TO GET - - ENOUGH, SOON ENOUGH!

Here is how your Editor views our production problems today—

—from the **TOOL ENGINEER**

"You as Tool Engineers have got to devise ways to get greater production per machine or we will never be able to reach our goal."

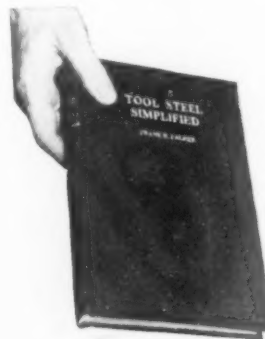
● If you have more than your share of problems brought on by industry's conversion to War work ... let Carpenter's diversified experience with tool steel problems be of help to you.

Keep in touch with your nearby Carpenter representative. His in-the-shop analysis of your specific problems may enable you to reduce the number of tool repairs, regrindings and replacements that hold up production. He can provide suggestions that will help you make every pound of tool steel worth more in terms of greater output.

Another useful Carpenter tool room help is "Tool Steel Simplified"—a handbook written in shop language to help every man produce more tools and better tools. Over 26,500 copies of this handbook are at work in tool rooms and heat treating departments answering questions like these: *How to make tools that wear longer?*; *How to be a trouble shooter?*; *How to prevent size change?* and *What is the relation of design to heat treatment?*

Enlist Carpenter's help in your battle against new problems of higher production and employee training. Call on your Carpenter representative for help with your specific problems.

And order your copy of "Tool Steel Simplified". This handbook is being offered at cost ... \$1.00 to tool steel users in the U. S. A. (\$3.50 elsewhere). After you have read it, you will want more men in your plant to have copies.



Over 26,500 copies of "Tool Steel Simplified" are now at work in tool engineering departments, tool rooms and heat treating departments. Order your copy now. (\$1.00 to tool steel users in the U. S. A.—\$3.50 elsewhere.)

THE CARPENTER STEEL CO. • READING, PA.

Carpenter
MATCHED
TOOL STEELS



THE TOOL ENGINEER

BROACHING ADVANCES CONTINUOUSLY

BROACHING, which has taken its place among machining methods as a process of great resource, is making continuous advances under the lash of war demand.

New methods of using broaching—new problems solved by it—greater speed—more economy—advances along these lines are of almost daily occurrence.

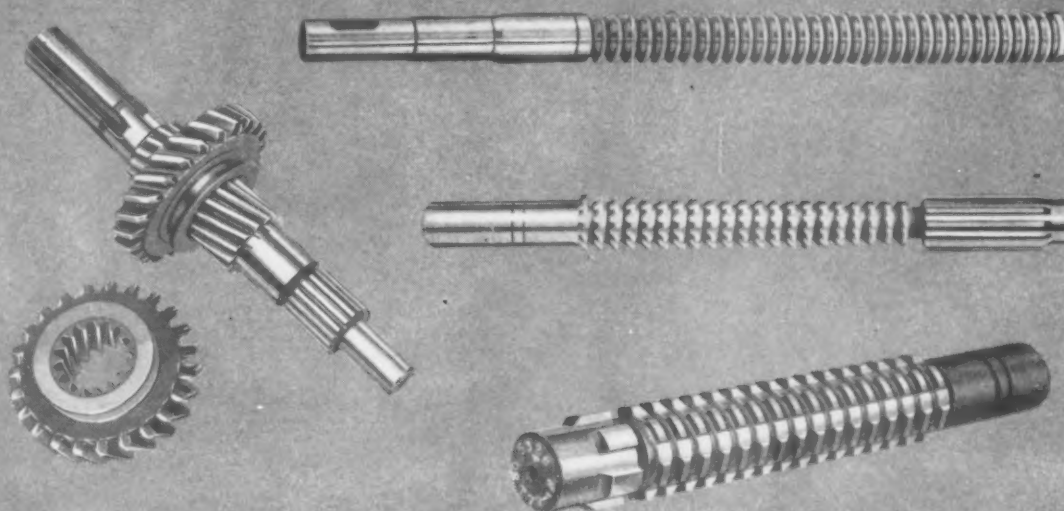
The Red Ring Double Jump Broach opens an entirely

new field of operation, making notable savings in time and tool cost. Red Ring Broaching of multiple involute splines for universal joints and other machine elements permits high strength-weight ratio, and operation with minimum back-lash.

Naloy steel and improved design have provided broaches of amazing ability to stand long runs with a minimum number of regrindings.

When you consider machining methods, consider broaching—and—get the latest information on broaching.

National Broach and Machine Company has pioneered much of the high production broaching. We have accumulated engineering experience that will be valuable to you. We'll be glad to consult.



**NATIONAL BROACH
AND MACHINE CO.**

RED RING PRODUCTS
5600 ST. JEAN - DETROIT, MICH.

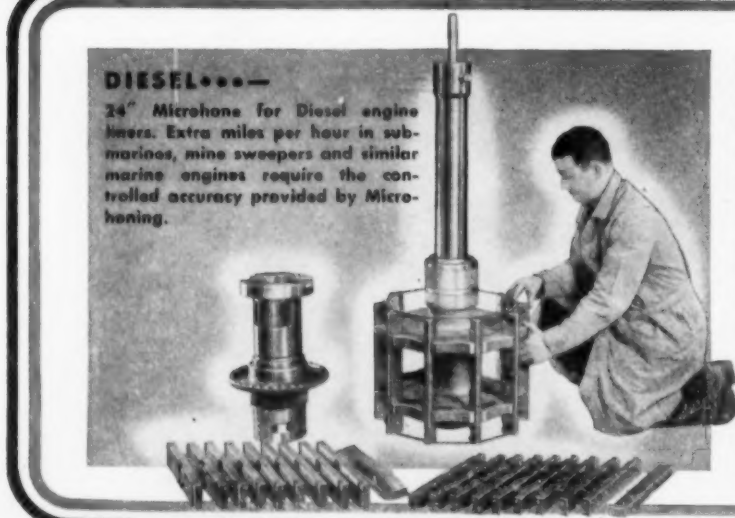
SPECIALISTS ON SPUR AND HELICAL
INVOLUTE GEAR PRACTICE

ORIGINATORS OF ROTARY SHAVING
AND ELLIPTOID TOOTH FORMS

INDUSTRY SHOOTS PRODUCTION MINUTES

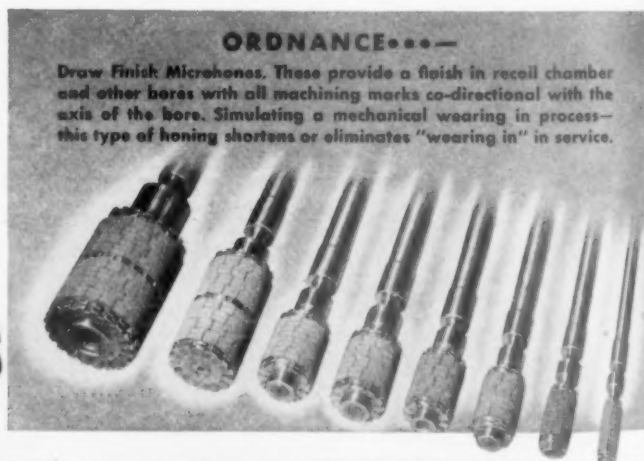
MICROHONING MAKES MORE HITS

SAVE TIME
★
SAVE METAL
★
SAVE COST
★
IMPROVE QUALITY
★
WITH
MICROHONING



DIESEL...—

24" Microhone for Diesel engine liners. Extra miles per hour in submarines, mine sweepers and similar marine engines require the controlled accuracy provided by Microhoning.



ORDNANCE...—

Draw Finish Microhones. These provide a finish in recoil chamber and other bores with all machining marks co-directional with the axis of the bore. Simulating a mechanical wearing in process—this type of honing shortens or eliminates "wearing in" in service.



ORDNANCE...
Large Microhones for gun barrels.

Micromatic Hones have lowered the time required for final sizing and surface finishing operations from days and hours to minutes and seconds.

Microhoning saves **TIME COST—METAL REMOVAL—MANUFACTURING COST—AND IMPROVES PRODUCT QUALITY**; which, combined, means more target hits in the tough service of WAR.

Micromatic Hones range from sizes for bores .303" to 25½" in diameter—from ¼" to 900" long. They generate geometrical and dimensional accuracy, uniform size and any desired surface finish with minimum removal of stock.



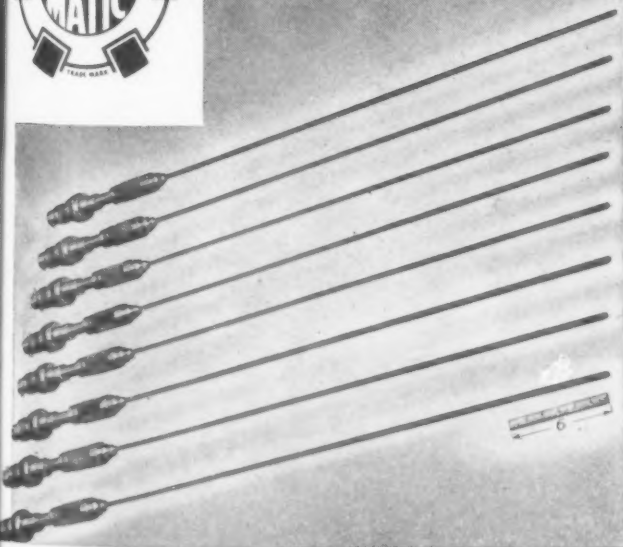
MICROMATIC HONE CORPORATION
1345 E. MILWAUKEE AVE. • • • DETROIT, MICH.



ORDNANCE...



ORDNANCE...
Rifle barrel Microhones for .303" bore have speeded and improved precision rifle making throughout the allied nations.



DIESEL...

The use of Microhoning is expanding rapidly. Let us send you literature on latest developments.

25 HOLES IN 3 MINUTES, 54 SECONDS



CP HICYCLE TOOL REAMS 1-1/6" HOLES THROUGH TWO 1-1/2" PLATES

Maintenance Low Despite High Speed

NEW YORK — Typical of the high sustained speed of CP Hicycle Electric Tools is the performance of a CP Hicycle Reamer in an Eastern shipyard. Employed in deck reaming, a CP Hicycle reamed twenty-five 1-1/6" holes through two plates of 1-1/2" steel in 3 minutes, 54 seconds.

With their high sustained speeds and ability to stand up under the hardest service, CP Hicycle Drills, Reamers, Grinders, Nut Runners, Tappers, etc., are helping industry to record production.



↑ **500 HOLES PER HOUR** is another Chicago Pneumatic Hicycle performance — with a forty per cent increase in production. Due to sustained speed, there was a big reduction in reamer bits broken.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York, N. Y.



↑ **1/4" HOLES IN 5/8" STEEL CASTING** are easy work for a Chicago Pneumatic Hicycle Drill. Ruggedly built, all of the Chicago Pneumatic Hicycle Tools are designed for heavy duty service.

← **HICYCLE INDUCTION MOTOR**, indestructible rotor, no sliding parts, rugged construction, insure lowest maintenance cost of any type portable tool.

↑ **WITH THEIR HIGH SUSTAINED SPEED**, Chicago Pneumatic Hicycle Grinders remove more metal in a given time. Because Chicago Pneumatic Hicycle speeds do not fluctuate, the emery wheels last longer.

CHICAGO



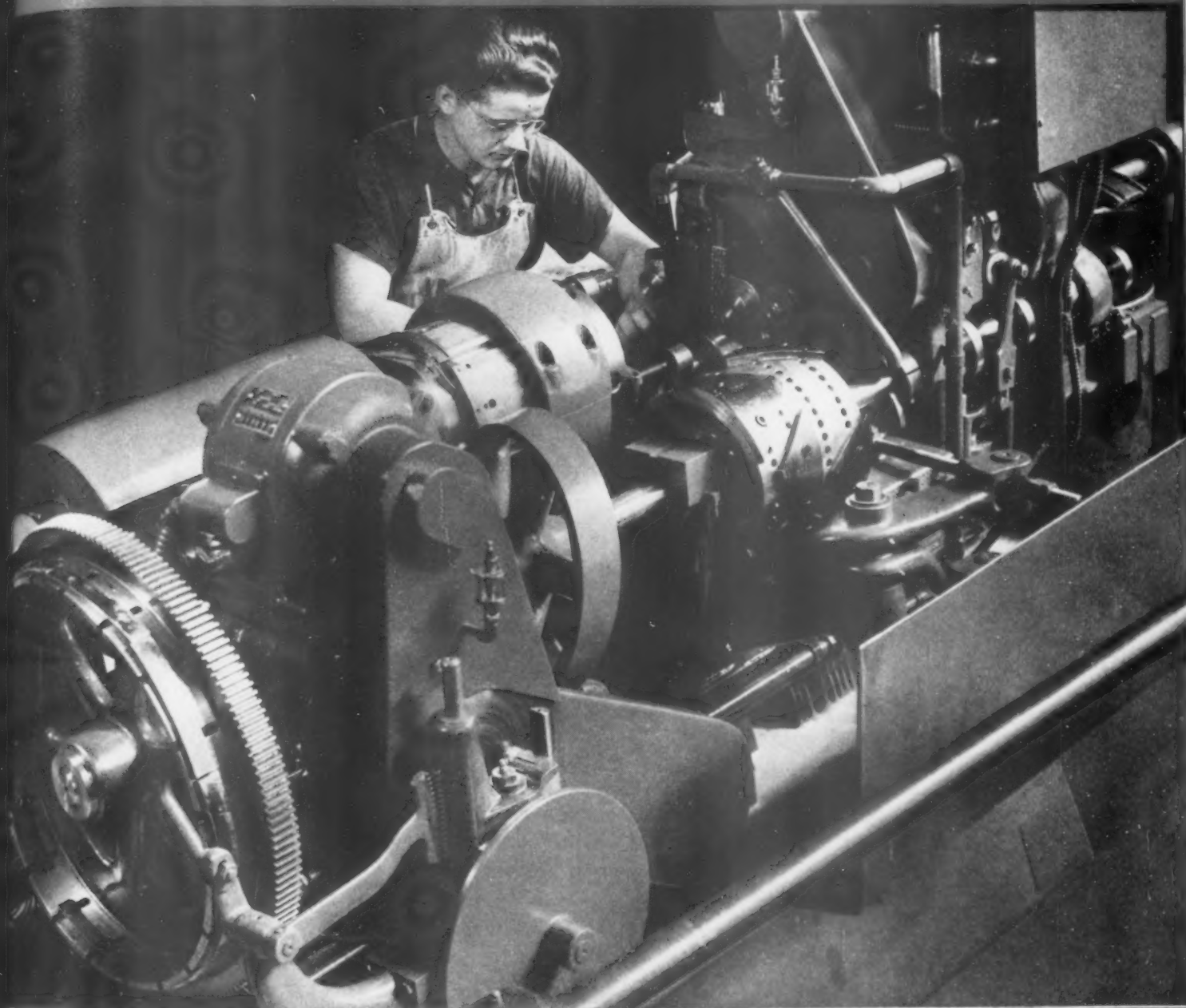
PNEUMATIC

ELECTRIC TOOLS

ALSO: Air Compressors, Pneumatic Tools, Hydraulic Aviation Accessories, Diesel Engines, Rock Drills

HICYCLE and UNIVERSAL
Drills
Reamers
Nut Runners
Screw Drivers
Grinders
Sanders
Tappers

Black & Decker SPEEDS PRODUCTION,
CUTS COSTS, WITH CLEVELAND MODEL "A"
Single Spindle AUTOMATICS



● With *small lots and short runs* constantly involved in their production of portable electric tools, The Black & Decker Manufacturing Company uses Cleveland *Single Spindle* Automatics to good purpose in avoiding "bottle-necks" in their fast-moving production schedule. ● Fitted into production, as "bottle-necks" on hand-screw machines occur, Cleverlands quickly produce the parts needed on time . . . *when time is short*. ● In 3¼-inch up to 8-inch capacity, Model A is provided with a 4-speed motor drive, universal camming and variable tool feed. In 1½-inch up to 2½-inch sizes constant speed drive is standard, but two-speed drive is optional at slight additional cost. Ask for information on the size of most immediate interest to you.

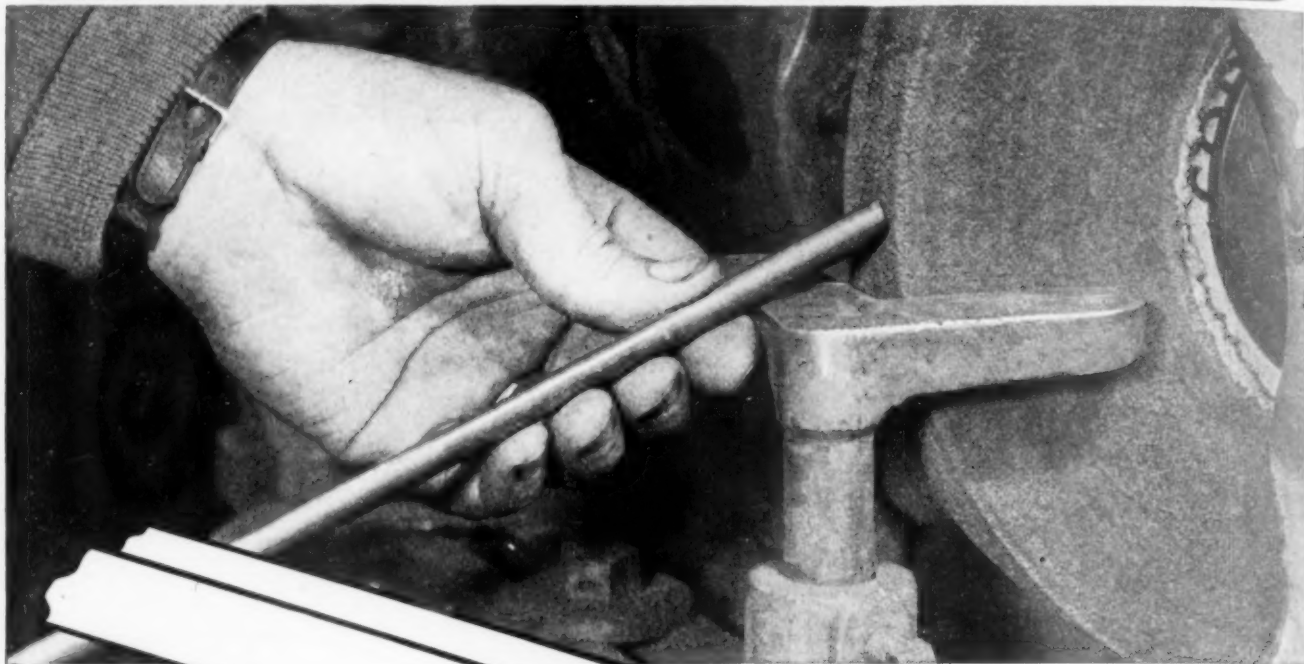
THE CLEVELAND AUTOMATIC MACHINE COMPANY
2269 ASHLAND ROAD, CLEVELAND, OHIO

Sales Offices at

Detroit, 540 New Center Bldg. • Newark, 702 American Insurance Bldg.
Chicago, 565 W. Washington Street • Cincinnati, 507 American Bldg.

CLEVELAND
Single Spindle
AUTOMATICS

HOW TO GRIND A RIFLE DRILL BY HAND



NEW, FREE GUIDE Will Help You Grind .30 & .50 Calibre Drills on Your Tool Grinder

This booklet has been prepared for practical shop men and for those confronted, for the first time, with drilling rifle barrels. It covers the four basic operations in grinding rifle drills. It is written in simple language, and contains 9 illustrations, together with diagrams, giving proper angles for

grinding. Unskilled help with a little practice and proper study of this booklet, should be able to grind rifle drills for efficient drilling of .30 and .50 calibre rifle barrels. Although we do not manufacture rifle drills nor grinders we have supplied many manufacturers with rifle drilling machines. This booklet was originally planned to assist our machine demonstrators in servicing these machines and is offered to you in the interest of better production of rifle barrels on your present drilling equipment.

FREE: Rifle Drill Grinding Guide

Write for this practical guide today. Use it to teach a simple grinding method to unskilled help. Keep it handy as a reference. It will help maintain production on rifle barrel drilling. Ask for as many as needed for your plant. Write for Bulletin T.E.G.



W. F. & JOHN BARNES .30 AND .50 CALIBRE RIFLE DRILLING MACHINES

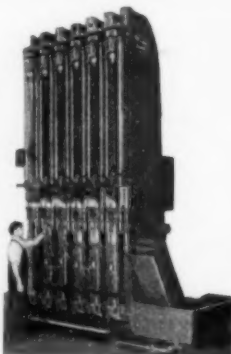
Included in our extensive line of Gun Drilling, Boring and Reaming machines are the two and six spindle machines as described below. If interested in similar machines for larger gun tubes, write for our complete set of bulletins.

NO. 410 — 2 SPINDLE HORIZONTAL

This machine was designed primarily for rifle barrel drilling, but is equally adaptable to diametrically balanced parts such as cam and crankshafts, boring bars etc.



FREE BOOK-LET: Write for bulletin T.E.-410.



SIX SPINDLE VERTICAL RIFLE DRILLING MACHINE

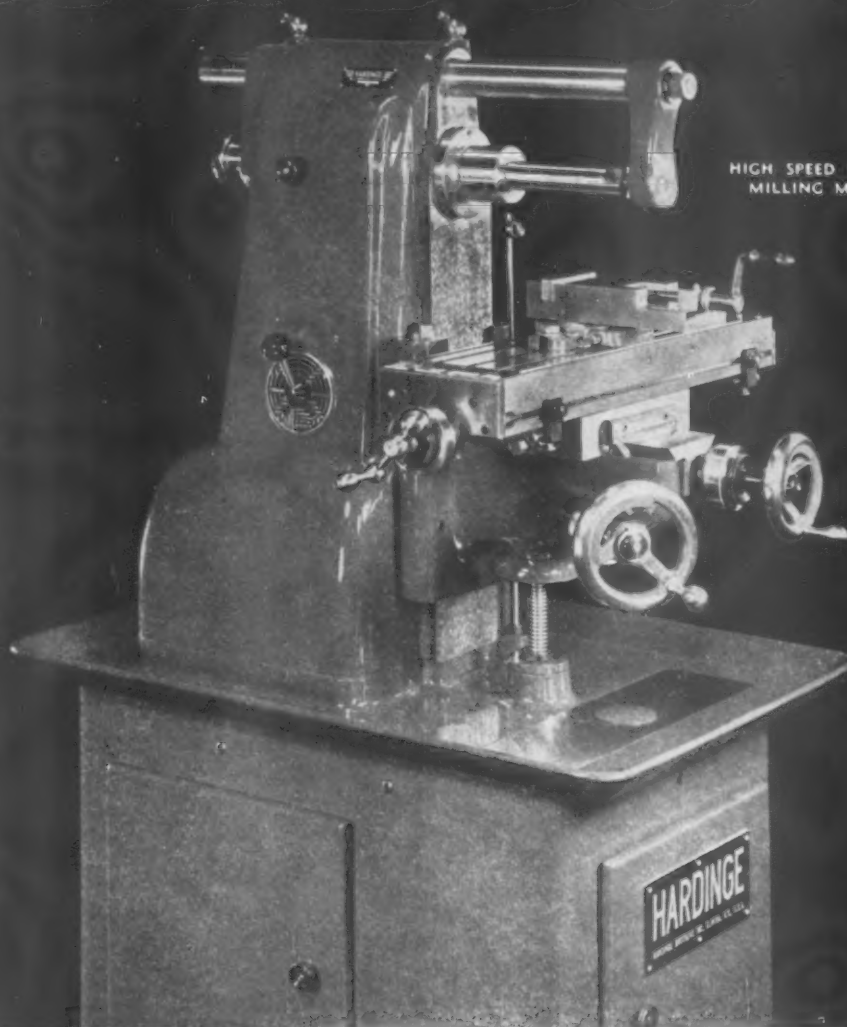
This machine is essentially a unit, designed to drill rifle barrels within a minimum of floor space. Six barrels are machined simultaneously.

FREE CIRCULAR: Write for complete information and specifications. Ask for bulletin T.E.6.

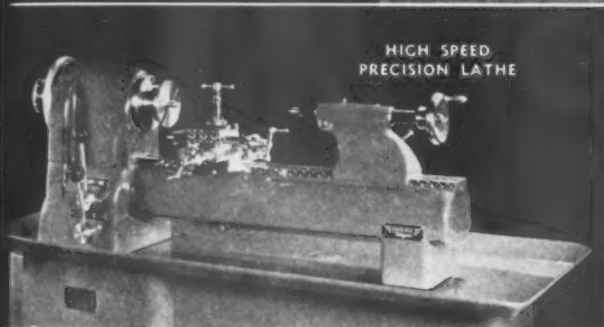


ROCKFORD ILLINOIS

HARDINGE



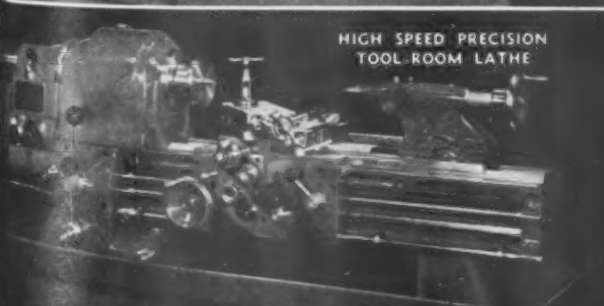
HIGH SPEED PRECISION
MILLING MACHINE



HIGH SPEED
PRECISION LATHE



HIGH SPEED PRECISION
SECOND OPERATION MACHINE



HIGH SPEED PRECISION
TOOL-ROOM LATHE

UNUSUAL CAPACITY

(No. 3 of a Series)

Hardinge pioneered the feature of having ample collet capacity. While always desirable, this feature is of particular value today. With it is combined the Hardinge preloaded ball bearing spindle construction, providing a range of spindle speeds for the proper machining of bar material, varying from 1/32" to 1" diameter or chucked work to 5" diameter.

The Hardinge 1" collet capacity is not through the use of a sleeve or other arrangement, but is direct in the spindle to provide the greatest degree of accuracy.

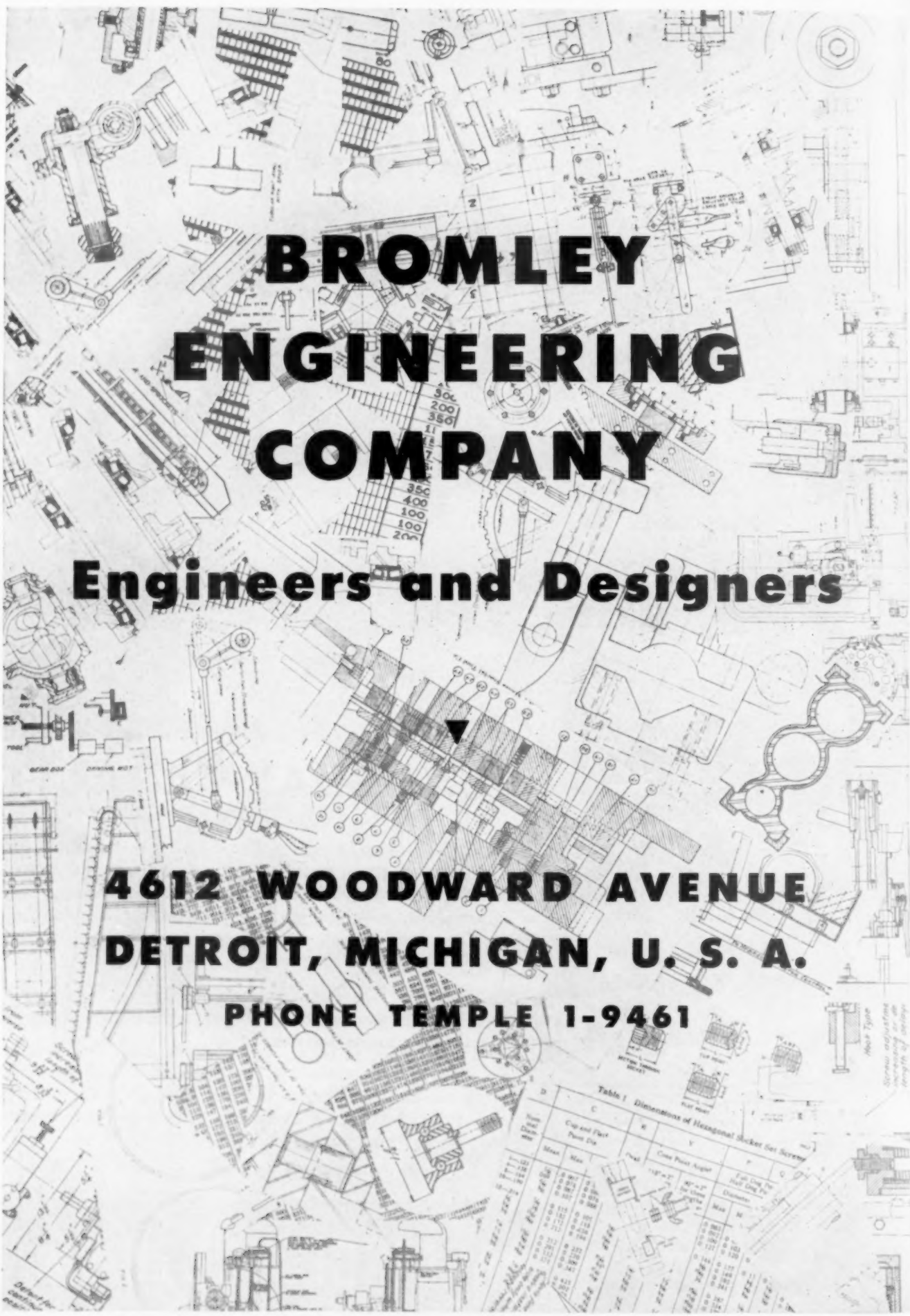
Another added advantage is that, with Hardinge, there is a matched relation between the various machines for interchangeability of collets, as well as a number of other attachments used in the spindle of each machine.

"Specify Hardinge and you are assured of engineered efficiency."

HARDINGE BROTHERS, INC.

ELMIRA, N. Y.

"Performance has established leadership for Hardinge"

The background of the entire page is a detailed technical drawing, likely a mechanical or structural plan. It features various components such as gears, shafts, bearings, and structural members, all meticulously drawn with lines and dimension lines. The drawing is oriented horizontally and covers the entire page area.

BROMLEY ENGINEERING COMPANY

Engineers and Designers

**4612 WOODWARD AVENUE
DETROIT, MICHIGAN, U. S. A.**

PHONE TEMPLE 1-9461

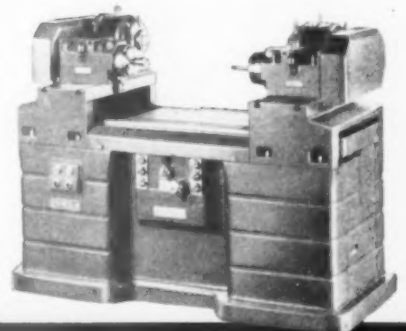
WINNING THIS WAR IS EVERYBODY'S JOB



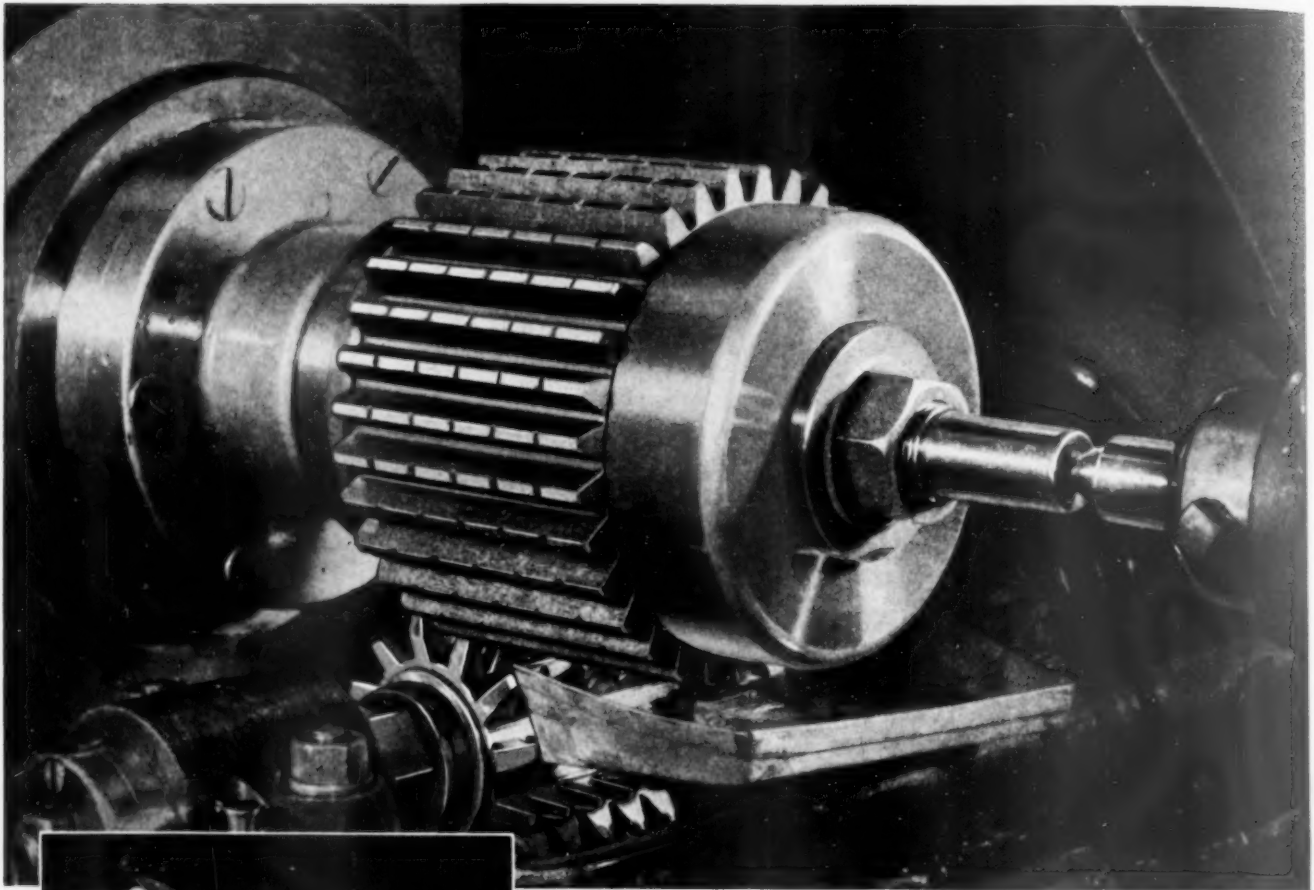
Thousands of new workers are pouring into factory doors to help produce the billions of dollars' worth of material vitally and immediately needed to win this war . . . sufficient long-experienced operators are just not available . . . it's a time when a modern type of standard machine tool like the Ex-Cell-O Precision Boring Machine can meet the emergency by doing a dual job: its easy control and automatic operating features make it possible to train ordinary operators in an exceptionally brief time to bore, turn, face, groove metal parts to the highest commercial standards of precision in size and finish, with a minimum of operator fatigue; this ease of operation, combined with basically sound engineering design and substantial, rigid construction for which all Ex-Cell-O machine tools are noted, assures the extreme in production, every hour, every day.

EX-CELL-O CORPORATION • DETROIT, MICHIGAN

Below: Standard Double-End Ex-Cell-O Precision Boring Machine—used for many multiple and progressive operations, on the same part or various parts, to speed up war production.



Precision THREAD GRINDING, BORING AND LAPPING MACHINES,
★ TOOL GRINDERS, HYDRAULIC POWER UNITS, GRINDING SPINDLES,
BROACHES. CUTTING TOOLS DRILL HIG BUSHINGS PARTS



.0002" RUNOUT...

BARBER-COLMAN HOBGING MACHINES HOLD CLOSE LIMITS ON A TOUGH JOB

SUCCESSFUL hobbing, on a production basis, of these tractor transmission fourth-speed ring gears is an excellent demonstration of the inherent over-all accuracy of Barber-Colman Hobbing Machines. With exceptionally close concentricity requirements, large arbors, ground for a snug fit on the inside diameter of the gear blanks and having outer center supports, were used. But, without accurate machines to drive them, these high-precision work-holders would have been wasted. Barber-Colman standard type "A" and type "D" Hobbing Machines successfully filled the bill, the only change being the addition of an auxiliary coolant pump, delivering up to 25 g.p.m.

PRODUCTION DATA FOR THIS GEAR

Size of work — 6.8" O.D., 3/4" face, 32 teeth, 5 pitch, 20° P.A., depth of cut .460".

Material — SAE 4620 steel, 160-175 Brinell.

Accuracy Required — to be within .0002" of runout on pitch line.

Load — 6 blanks, on snug-fitting arbor with outer center support.

Hob — 4" x 4" x 1-1/4" taper hole, single thread, ground.

Machine Set-up — hob speed 174 r.p.m., feed .045" per rev. of work, conventional cut.

Production — 27 min. floor-to-floor, per load of 6 pieces.

Hob Life — 12 pieces per setting, 7 settings, 84 pieces per grind.

WE WANT TO HELP YOU

Barber-Colman Company stands ready to help you toward achieving the greatest possible production capacity, or accuracy or both, from your machines. Call your B-C representative as his practical experience may quickly lead the way to unsuspected opportunities for worth-while gains.

BARBER-COLMAN COMPANY

General Offices and Plant 213 Loomis Street, Rockford, Illinois, U. S. A.



HOBBS, HOBGING
MACHINES, HOB
SHARPENING MA-
CHINES, REAMERS,
REAMER SHARP-
ENING MACHINES,
MILLING CUTTERS,
SPECIAL TOOLS

LATROBE



Metallurgical Service

*...to help
solve your
tool steel
problems*



★ Maximum Production is the goal of all industry today!

You can rely on the qualified assistance of an experienced Latrobe Metallurgical Engineer to help you secure *maximum production* from the tool steels you use. It's an advisory service —designed to lend co-operation NOW when you need it most, and without obligation on your part.

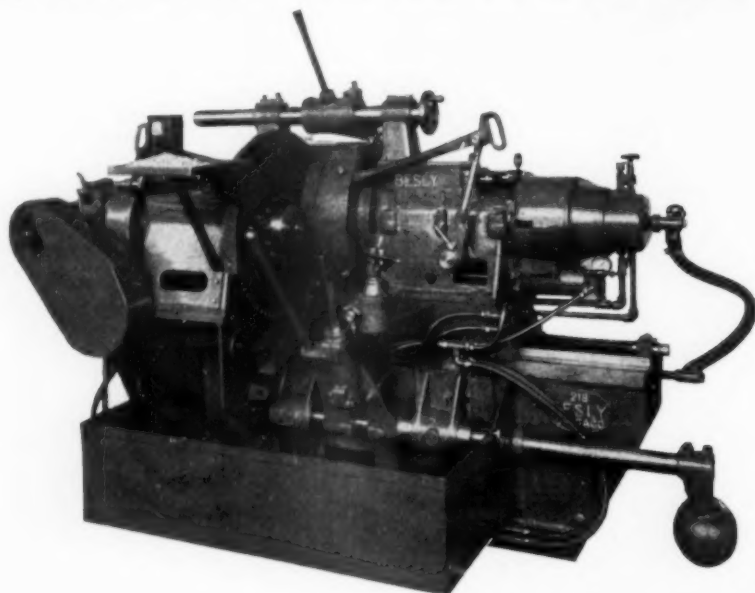
You may have a problem of selection, or of application. Or perhaps you need to substitute one composition for another. Or it may be a matter of heat treating that proves perplexing.

In any event, feel free to call upon Latrobe!

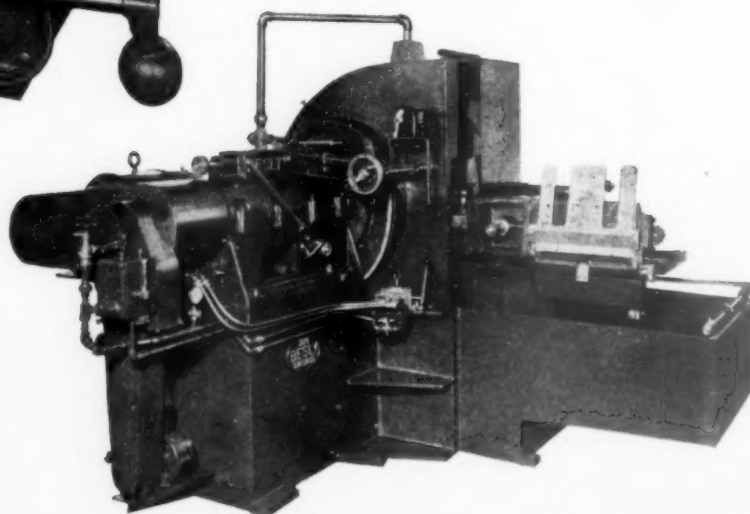
Latrobe ELECTRIC STEEL COMPANY

MAIN OFFICES and PLANT • LATROBE • PENNSYLVANIA

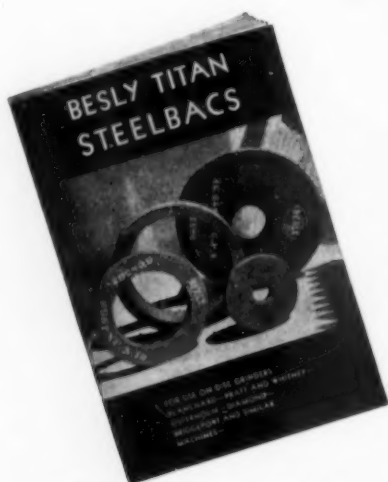
From the House of BESLY comes an array of Grinding Machines for specific and general purpose. Illustrations give you some idea of the versatility of Besly Engineers.



No. 218—23" Wet Besly Double Spindle with Rotary Feeding Fixture for large runs of comparatively small pieces and Hand Operated Swinging Fixture for larger pieces handled in small lots.




No. 226—30" Wet Single Spindle Besly Grinder with Combination Hydraulic and Ratchet Feed on wheel spindle carrying 30" x 22" x 2" Besly Titan Steelbac Abrasive Disc served by Hydraulic Travelling Table. Fixture—Double End Indexing Type holds 16" wide tobacco knives ground at the rate of sixty pieces per hour. Write for No. 219-A Bulletin describing many other interesting Besly Grinder developments. Why not investigate the possibility of Besly grinding your flat surfaces?



*Write for your copy of Booklet
on Besly Titan Steelbacs*

If you operate a Blanchard, Pratt & Whitney, Diamond, Osterholm, Bridgeport or similar machine you should be using Besly Titan Steelbac Abrasive Wheels. Buy grinding members for Disc Grinders from the leader.

CHARLES H. BESLY AND COMPANY
118-124 NORTH CLINTON STREET ★ CHICAGO, ILLINOIS



Turning out more **IN LESS TIME ?**

You should be getting more production per machine if you're keeping step with the leaders in your industry. Otherwise, it's time to plan for the replacement of obsolete equipment.

This speed-up in machining didn't just start with the defense program. It began long before, when Gisholt engineers put new ideas on the drawing boards and then transformed them into the present line of Gisholt Turret Lathes. Remarkable savings in time and money have been made possible on many types of metal-turning work.

Any executive who is concerned with building a better product at lower cost, should watch these developments.

Look ahead . . . keep ahead . . . with Gisholt improvements in metal turning

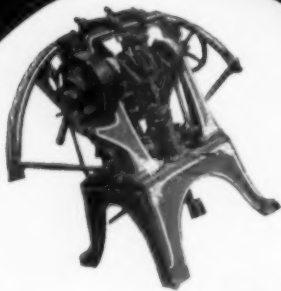
GISHOLT MACHINE COMPANY

MADISON, WISCONSIN



TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES

Since 1875 • SPECIAL INDUSTRIAL MACHINERY • Since 1875



**This Broom-Stitcher
Was Once a Prime Tool!**

Yes, over 50 years ago, low-cost brooms were one of the crying needs of civilization and progress. Lipe helped to make them possible by this automatic broomstitcher. For 67 years, Lipe inventors and skilled mechanics have designed and built machines to supply many of industry's special needs.

TODAY, the

LIPE

CARBO-MATIC LATHE

turns tough armament steels to
rough-grinding contours with
only one pass



TURNING to rough-grinding tolerances with only one pass, the LIPE CARBO-MATIC LATHE gives cutting speeds, rates of feed and depths of cut that were undreamed of five, or even three, years ago.

That's because the LIPE CARBO-MATIC was designed especially for carbide tools. Designed for tough armor plate alloys and armor-piercing projectiles . . . for the multiple-part production of mechanized war-

fare . . . and for the unimagined productions of a more-thoroughly mechanized peace.

LIPE CARBO-MATICS are Massive and Rigid. Result . . . Out-of-round, out-of-true, chatter, tool breakage and scrap are held to a minimum. Tools give more cuts between grindings. The finish of the work mirrors the story of the smooth-flowing power.

This lathe is fully automatic. Hydraulic control governs the holding equipment, longitudinal and cross feeds and tailstock quill.

Swing over carriage 8", between centers 30". Write for delivery dates.

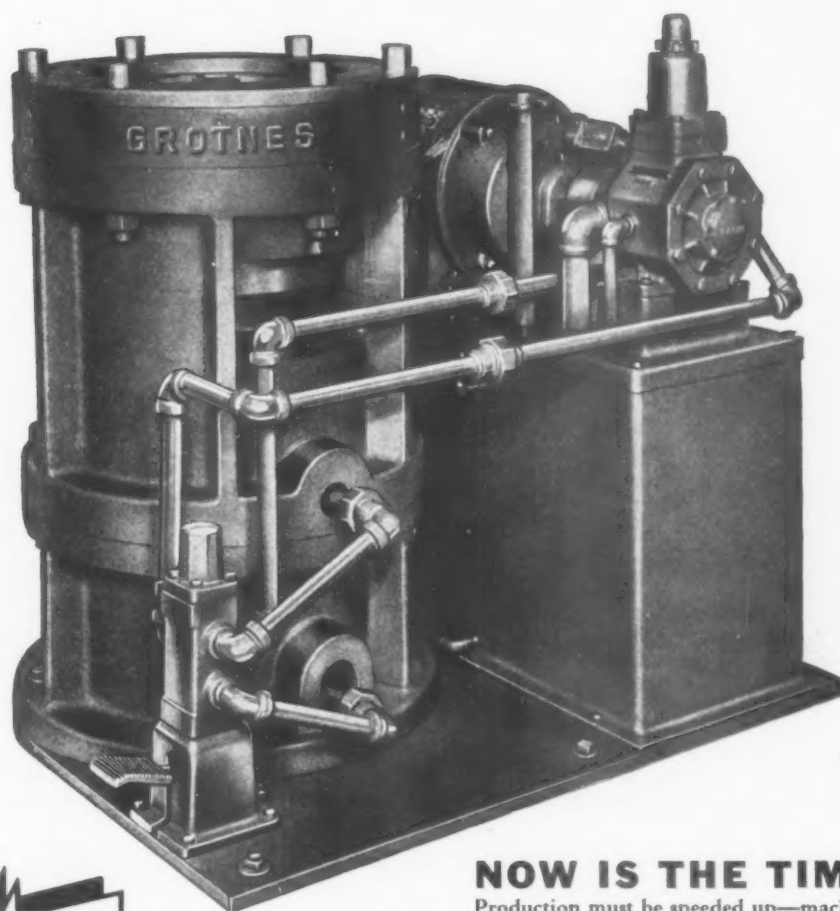


LIPE-ROLLWAY CORPORATION

Syracuse, N.Y.

FOR *Simplicity*

INSTALL RACINE VARIABLE
VOLUME HYDRAULIC PUMPS AND VALVES!



NEW!



Write for
CATALOG
P-10-C

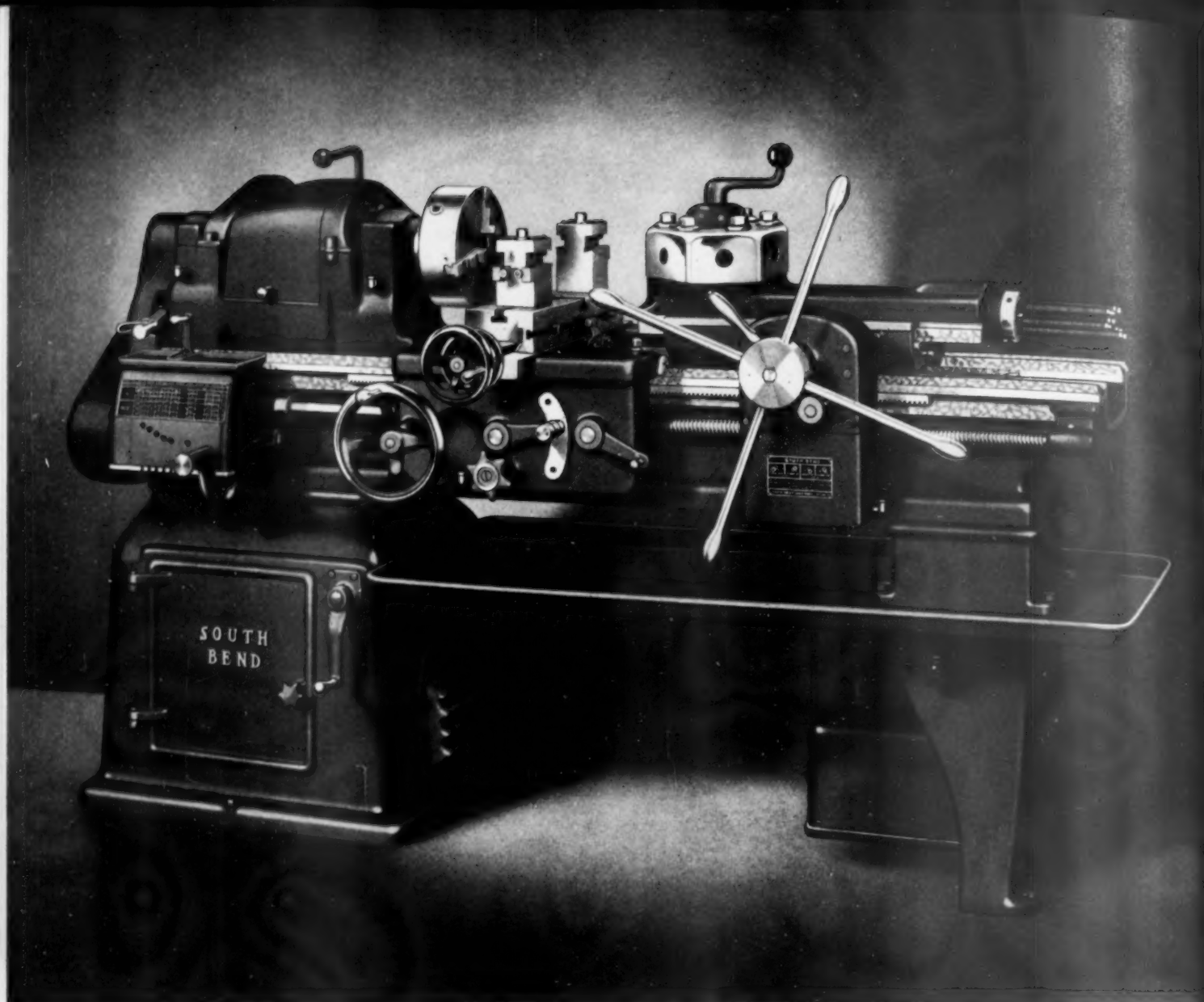
NOW IS THE TIME—1942!

Production must be speeded up—machines simplified and made ever more productive. With RACINE smooth—directly applied—hydraulic power you efficiently increase your output and eliminate complicated mechanisms which wear—get out of adjustment—consume time.

The Charles Grotnes Machinery Company's Shell Banding Machine uses RACINE Hydraulic units to increase shell production. How? By having one machine with readily interchangeable dies for banding shells from 20 mm. to 155 mm. By using a single RACINE Variable Volume Pump to operate all dies simultaneously. By using a single RACINE Foot Operated 4-Way Valve to control the exact position of the dies leaving the operator's hands free to handle shells.

This is fast, simple, fool proof design. RACINE offers a full line of variable volume pumps and hydraulic valves and controls—proven and tested—to speed your production in munitions, die castings, plastic moulding, metal forming, pressing, coining, etc. Write now for our new catalog or better still—make free use of our engineering experience to help solve your problems.

RACINE TOOL & MACHINE CO.
1777 STATE ST. . . . RACINE, WIS.



SOUTH BEND TURRET LATHES

For Efficient Production of Duplicate Parts

THE No. 2H South Bend Turret Lathe is a dependable tool for the efficient production of duplicate parts. It has the precision for exacting, close-tolerance operations, ample power, and the rigidity required for producing a fine finish.

Twelve spindle speeds, ranging from 16 to 880 R.P.M. are available. A two-speed motor with convenient lever control permits quick change from high to low speed for reaming and tapping operations. Smooth operation for precision turning and boring operations at high speed is achieved by direct belt drive to the spindle. Slow speeds for heavy cuts on large diameters are driven through back gears.

Bar work up to 1" round may be passed through the collet. The spindle hole has a capacity for stock up to 1 $\frac{3}{8}$ " in diam-

eter when a universal chuck is used. Maximum capacity for chucking operations is 6 $\frac{7}{8}$ " swing over the universal saddle cross slide and 16 $\frac{1}{4}$ " swing over the bed ways.

The ram-type turret has power feed and hand feed, with individual adjustable feed trip and stop for each of the six turret faces. The turret head indexes automatically on the return stroke of the turret slide.

The universal carriage has power cross feeds and power longitudinal feeds, also lead screw and splitnut feeds for cutting accurate screw threads. Plain cross slide fitted with front and back tool blocks is standard equipment. A 4-way turret tool block can be supplied to order. Write for a catalog and the name of our dealer located nearest you.



SOUTH BEND LATHE WORKS

923 EAST MADISON STREET, SOUTH BEND, INDIANA, U. S. A.

LATHE BUILDERS FOR 35 YEARS

BUY U. S. WAR SAVINGS
BONDS AND STAMPS



BUY ALL YOU CAN, AND
KEEP ON BUYING!



HANDS THAT KNOW THEIR STRENGTH

AMERICA today is a nation of fixed and indomitable purpose. It knows that, in this war, fighting forces across the oceans cannot triumph until the industrial armies at home—those in the service of supply—first win *their* victories. And America also knows its strength.

Allegheny Ludlum is a sinew of that strength. Our alloy steels wing aloft in planes. They cruise in ships and submarines. They serve in tanks, ordnance and field equipment, and tool the machines of production. They are essentials.



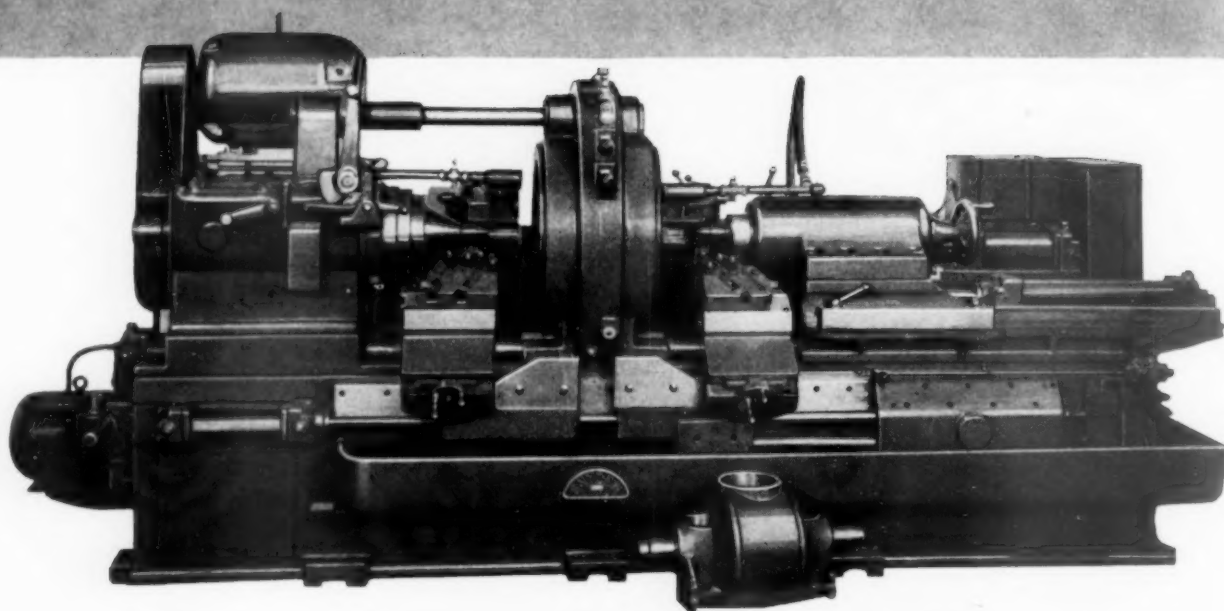
We have spent millions to increase the productive capacity of our mills. We have taken steps also to conserve strategic materials, vital to the nation in wartime. Recent products of Allegheny Ludlum research, steels which use less alloy without loss of performance, have been made available to anyone without restrictions.

These are the crucial months. Pledge all your energies, as we pledge ours, to America . . . with its sleeves rolled up to win this war in the only way it can be won—by *production, and the offensive!*

ALLEGHENY LUDLUM STEEL CORPORATION
PITTSBURGH, PENNSYLVANIA

★ Stainless and Heat-Resisting Steels ★ Tool Steels ★ Valve Steels ★ Nitriding Steels ★ Electrical Steels

Removing up to 6 times the amount
of stock originally estimated . . .
and Increasing Production 65%



A SNYDER, Heavy-Duty, Hydraulic Turning Machine

THIS Snyder Heavy Duty, Double-end Turning Machine illustrates the value of hydraulic feed as applied to turning machines.

In actual operation, this machine is removing up to 6 times the amount of stock originally contemplated, this necessitating TWO heavy cuts instead of ONE heavy and one light cut. But in spite of this, actual production is 65% more than estimated.

The tailstock is provided with a long, hydraulic cylinder to facilitate loading. The right hand front tool bracket, when swung into clearance position, provides a loading platform in line with the locating surface in the center drive.

When the part is loaded and pushed into place between centers, it is clamped manually and the tailstock locked in place, ready for the first of the two turning operations.

The machine is constructed with very heavy cross-sections in all vital parts and this heavy construction not only contributes to successful operation but also made it possible to step up estimated production by 65%.

This increase is achieved in spite of this fact that both front and rear tool blocks are adjusted manually between the first and second cuts.

We invite correspondence regarding your own particular production problems.

SNYDER

TOOL & ENGINEERING CO.

3400 E. Lafayette Ave. • Detroit

*designers and builders of machinery
for **HIGH** production at **LOW** unit cost*

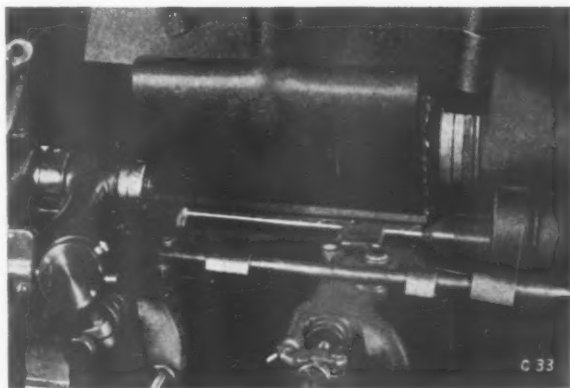
7100% INCREASE IN PRODUCTION

Such an increase appears incredible, yet it actually happened at the plant of a gun manufacturer.

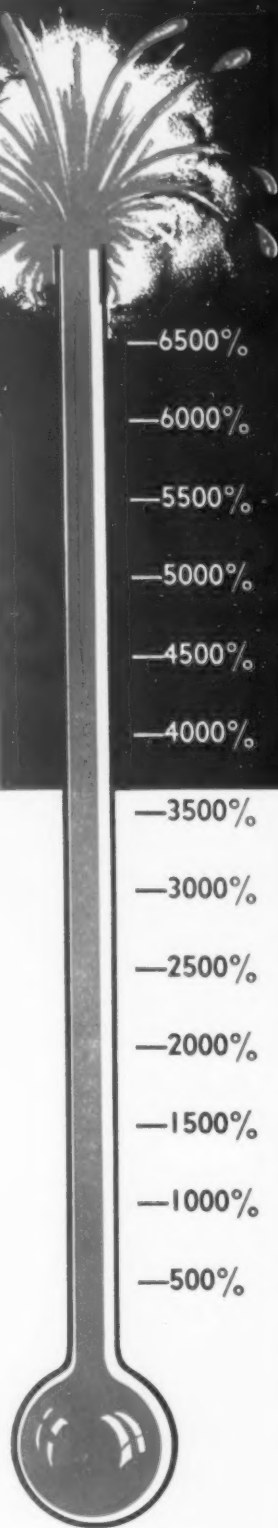
Certain highly accurate control rods having 8 tapered diameters were being hand finished in this plant. Six and one-half hours were required to finish each rod within specified limits. Such methods were clogging production and holding up much needed equipment.

Then a Landis 10"x36" Type DC Plain Grinder was installed. It was equipped with an 11" face wheel profiled to conform to the diameters of the work so that only one straight infeed operation was necessary to finish grind the rods. A mere 5 minutes were required for each rod--a production increase of 7100%.

Look around your plant. Perhaps you too have some jobs that are now being finished by hand and could be finished much more accurately at a far greater production rate on Landis grinding equipment.



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Performance
As Usual*



LANDIS TOOL COMPANY

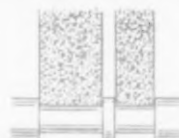
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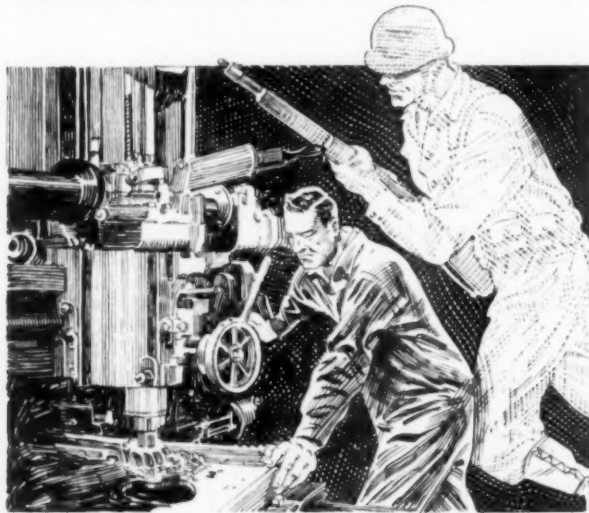


IDEAL
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WHEEL GRIND-
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IN ORDER THAT WE
MAY *Conserve* THE
Resources OF OUR
AMERICAN INDUSTRY

★ ★



★ From the first, our task has been to save the millions of tons of metal represented in a nation's tools by returning them to active service. But we took on a further obligation; namely, to give back to the customer a renewed tool which would be actually *better than the original*. Last year American industry entrusted us with a volume of tools for the reconditioning of which it paid us over \$1,000,000. A 31-year background covering every phase of tool reconditioning has perhaps served to stand for the responsibility of our three companies.

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Saved Hours OF HAND-FINISHING TIME WITH **GORTON** ON THIS WAR JOB

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A FEW GORTON CIRCULAR TABLES ARE AVAILABLE FOR IMMEDIATE DELIVERY—Precision built, for a lifetime of service. Simple, positive adjustments compensate for wear. Table surfaces are accurate within .0005". Work may be indexed to 5 minutes or less. Standard sizes: 10", 12", 15" diameter. For full details write for FREE Accessories Catalog 1317-D.

PRODUCING TOUGH ALLOY STEEL DIES within maintained limits of $\pm .001''$ or closer, makes possible a saving of hours of hand finishing. This job and many others like it being turned out by a midwest die and mold manufacturer is a typical example of what can be accomplished with the combination of a Gorton Super-Speed Mill and a Gorton Circular Table, accurate within .0005".

Photo above shows how the die is simply mounted on the circular table. Large micrometer dials on the Gorton Miller and the sensitive "feel" of the machine permit the operator to hold close tolerances with hand feed. Utilizing the Gorton wide range of spindle speeds, these dies are completely machined in 30 hours. Precision milling in this manner produces a finish so smooth that hand finishing is reduced to a minimum.

Gorton Engineers, specializing in Vertical High-Speed Milling, will be glad to make recommendations on your work—without obligation.

HOW TO REPRODUCE ORIGINAL DIES *without Skilled Help*

NOTE—To owners of Gorton Super-Speed Vertical Milling Machines built since 1935—if you have **MULTIPLE DIES TO REPRODUCE** from an original, order a GORTON Duplicating Tracer Head and Duplicating Table to quickly convert your Miller into a double-purpose machine, capable of Duplicating parts and sinking dies, as well as Milling.

This equipment will effect an average time-saving of 50 per cent with an *unskilled man or woman* operator.

SUPER-SPEED MILLING DATA

MACHINE—Gorton Super-Speed Vertical Mill.

PART—Alloy Steel Die.

CUTTERS—Gorton Single and Double Flute Cutters.

DIMENSIONS—1½" Deep to Parting Line.

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FEED—Hand.

SPEED—950 RPM.

ACCURACY—Limits held $\pm .001$.

FLOOR-TO-FLOOR TIME—30 hours on Mill to very smooth finish.

WRITE FOR **FREE**
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giving details on Gorton Super-Speed Vertical Milling Machines.



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fuse cap PARTS 1400 PER HOUR



The photograph at the upper left shows an AMERICAN 16" Rotary on pedestal to broach slot in brass fuse part. Production of 1400 pieces per hour is obtained.

The photograph at lower left is a close up of the 8 station fixture. The fuse part is shown on top of the fixture, also one is shown in the clamping fixture.

The parts are manually loaded as the table revolves at the rate of one revolution in 20 seconds. Parts are automatically clamped, broached and discharged.

This is another of American Broach & Machine Company's contributions toward increased war production.

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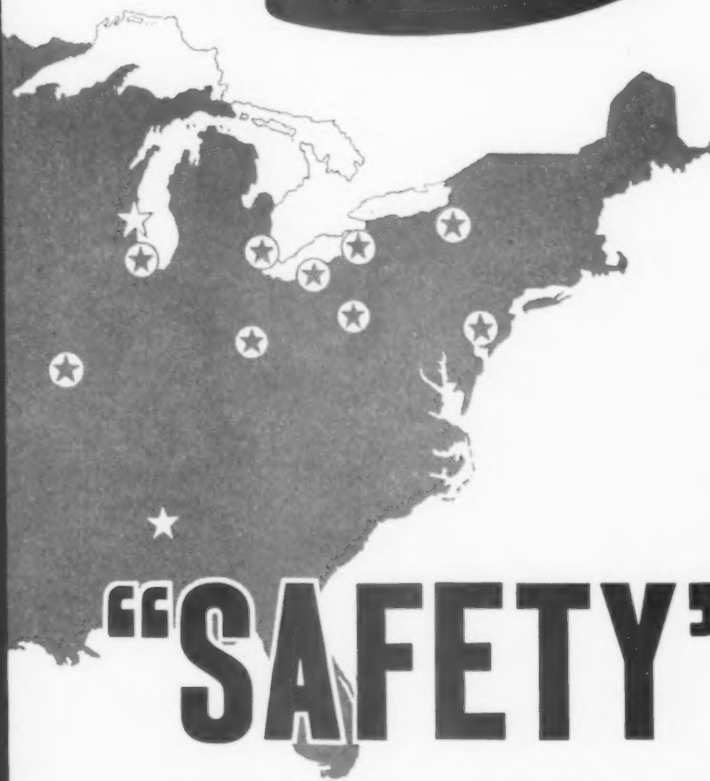
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THE SAFETY GRINDING WHEEL & MACHINE CO.

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ESTABLISHED 1891

8 Weeks from Today!

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Your present manually controlled machine tools and their same operators go into *semi-automatic* production at accuracies and speeds you never believed possible.

DUPLIMATICS will do it for you. These portable precision controls are connected with the feed screws of the machine and duplicate an original pattern or template directly and semi-automatically in metal at high speeds and with great accuracy.

DUPLIMATICS are profitable for even relatively low production runs. They are foolproof in operation. Operators "catch-on" quickly. Maintenance is not a problem. We can usually make shipments within eight weeks.

The unerring accuracy with which a **DUPLICATOR** will direct the movement of cutting tool is uncanny. Steep walls are climbed without digging in. Accuracies depend on the speed of operation, but many high production speed jobs are being done within 0.001 inches. Aside from loading the work, the operator's job is largely a matter of occasional button pushing.

In the present production race **DUPLIMATICS** are proving themselves invaluable. In the sharp competition that comes "after the duration" they'll be an absolute necessity.

Tell us about the work you'd like to put on a semi-automatic basis.

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216 St. Aubin St., Detroit, Mich., Telephone: Fitzroy 2200

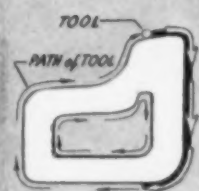
These are sketches of the simplest and most typical types of work now being handled by DUPLIMATICS.

Dual control for use with engine lathe consists of portable control and tracer mechanism with drive heads for connecting with lead and cross feed screws.



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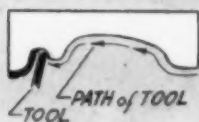
MILLING



TURNING



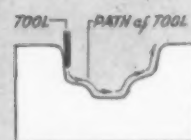
BORING

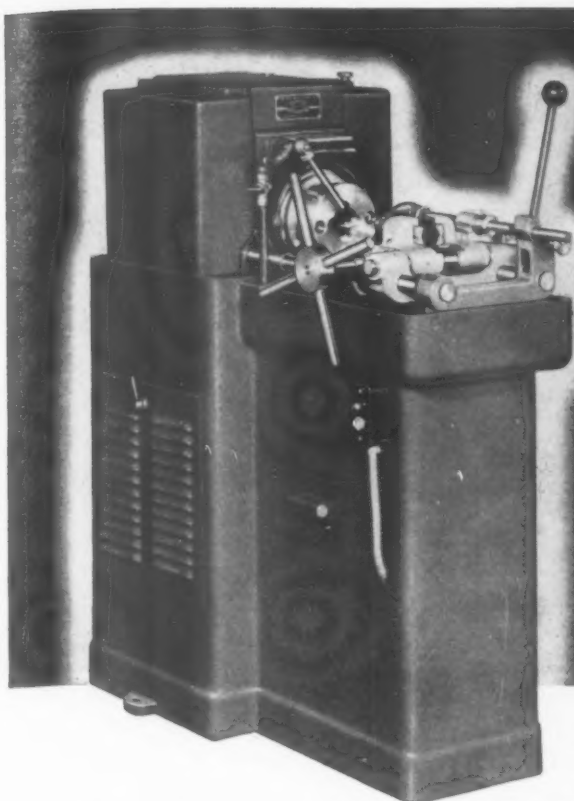


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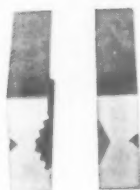




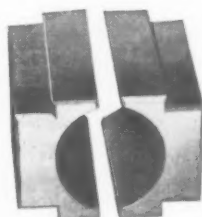
OSTER

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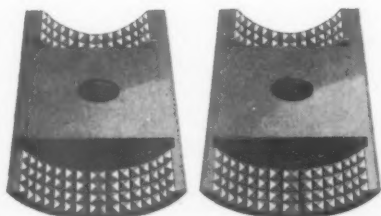
... for Fast, Accurate
Threading of Bolts,
Rods, Studs, Pipe, and
Nipples



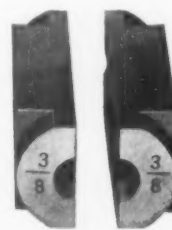
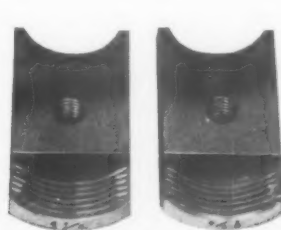
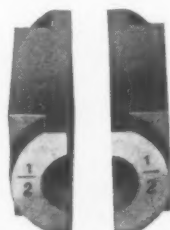
Standard vise jaws which are reversible for holding either round or square stock or hex head bolts.



Smooth inserts for holding stock which must not be marred. {One set necessary for each size—extra equipment.}



Diamond point inserts for gripping plain ends of short nipples; each set holds two sizes {1/4" & 3/8"} {1/2" & 3/4"} {1" & 1-1/4"}—extra equipment.



Illustrated below are threaded inserts for holding threaded end of short nipples; each set holds two sizes: {1/4" & 3/8"} {1/2" & 3/4"} {1" & 1-1/4"}—extra equipment.

THE OSTER MANUFACTURING COMPANY

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Hydraulic PRESSES

ON THE JOB

* 75-ton Hannifin hydraulic press being used for forming heavy bar stock. This press has a long table and is adaptable to a variety of work.



75 TONS AT A FINGER-TIP TOUCH

This 75-ton Hannifin hydraulic press being used for forming heavy steel hoops offers a typical example of the fast, accurate, easy handling that means steady production on pressing, forming, straightening and similar work. The exclusive Hannifin sensitive pressure control gives the operator

infinitely variable in proportion to the amount of control lever movement. This control is so simple, so natural, that press operations are much easier to handle, and consistently faster and more accurate.

Hannifin standard presses present many advanced features including welded steel frame construction, built-in hydraulic power units, standard cylinder construction, and simplified control. Hannifin design permits modification to meet individual requirements. Table construction, gap, reach, and ram stroke may be modi-

fied to adapt the press performance to specific needs, avoiding the delays incident to special design. Ram stroke is adjustable, to avoid unnecessary up-travel of ram in production operations.

For help on problems of production straightening, forming, press-fit assembly or similar work involving the application of pressure, write for press bulletins, or consult Hannifin engineers for specific recommendations.

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complete control of ram pressures with a single hand lever or foot pedal control. Any pressure from a few pounds to full capacity is available,

HANNIFIN

Hydraulic PRESSES



Proving Their Power

TOOL ENGINEERS can win this war. What can they do in the peace that will follow?

Let's begin with how Tool Engineers are producing for victory, how they are baffling an enemy half a world distant.

A vivid story was told by Brigadier General Kenneth D. Wolf in *THE TOOL ENGINEER* for April. It concerns an incident following the Japs' supposed destruction of flying equipment on Bataan Peninsula.

"Suddenly, three American B-40 pursuit planes came out of nowhere and attacked. Some 30,000 troops . . . 30,000 tons of shipping were destroyed . . . American mechanics working in the jungle had taken wrecks and put them together . . . There was little equipment . . . but they managed to get three airplanes in the air . . . and back on the ground."

That's how Tool Engineers are winning—by producing interchangeable parts.

The Japs, considered the best imitators in the world, did not comprehend that the science of Tool Engineering could apply with such dramatic effect on the Bataan battlefield. They did not realize that they had only destroyed assemblies from which ingenious Yankee mechanics could salvage interchangeable parts to re-assemble other units.

War has shown the extraordinary degree to which interchangeability has been developed in this country, more, it has raised the Tool Engineering profession to new prominence. War has shown that as this profession fulfills the nation's promise to win the war, it will also fulfill the promise to win the peace that follows. Tool Engineering will itself be this country's sharpest "tool" for world reconstruction.

Fanatical fascist leaders have yet to show their followers the plausibility of the glowing future they promise. Tool Engineers have proved their power for construction in their ability to destroy the enemies of civilization. And, unlike the enemy who bars millions of humans from more than bare subsistence, their first principle is to mass produce for the most at the lowest cost.

The way Tool Engineers produce to win this war is the way they will produce for peace.

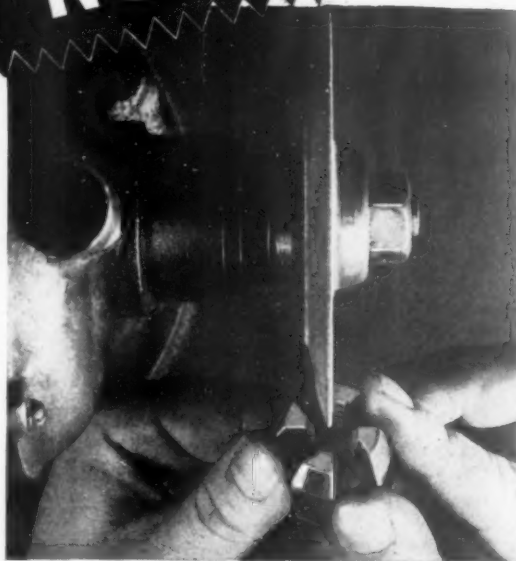
WASTE NOT... WANT NOT

"Acorn" Dies will cut perfect threads until repeated sharpenings have ground away more than half of the lands. Now that universal demand makes it hard to get all the dies you need, be sure you get full value from your present stock—by using them until further grinding is not practical. Here's the way to sharpen them so they will last longest and cut best.

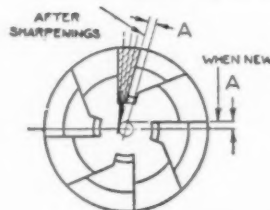
To grind the cutting face hold the die as in the illustration and grind the cutting face on a saucer wheel. Take light cuts so as not to burn the threads. Maintain the original angle of the cutting face with relation to "center" (see diagram). See that the same amount of metal is removed from each land.

Grind the chamfer at the die's throat with a pencil wheel. (See below.) Put a slight relief on the chamfer; that is, remove more metal toward the heel than at the face. Use a solid rest for your hands to hold the die steady.

Special holders can be obtained for the smaller size dies which are difficult to handle.



Grinding face on saucer wheel



When grinding the face, maintain original cutting angle this way



Grinding chamfer with pencil wheel

If properly ground, the die will still cut perfect threads, even though the lands are quite thin.

Actually "Acorn" Dies are very easy to sharpen and a little practice will enable anyone to do a good job and double or treble their normal life.

This is one of a series of advertisements published by Greenfield Tap and Die Corporation to help users get greater production from their small tools in these critical times, through making useful facts more widely known

GREENFIELD TAP AND DIE CORPORATION • GREENFIELD, MASS.

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TAPS • DIES • GAGES • TWIST DRILLS • REAMERS • SCREW PLATES • PIPE TOOLS

Plastics

in national defense

H. A. Frommelt

Research Director
Kearney & Trecker Corp., Milwaukee

Are plastics an engineering material? How do they compare with metals in defense and peace-time applications? The research director of a leading milling machine company answers these questions. He also describes mold-making, speeds and feeds, and points to the Tool Engineer's future in the plastics field



H. A. FROMMELT

"Within the next decade or two, the plastics industry will be the equivalent of our present steel industry"

AS most of us know, plastic is more than just a substitute material to be used in an emergency such as today's. True, it is being used in place of some traditional materials, but many of these substitutions should have been made ten or more years ago.

The fact is that plastics have inherently good engineering character-

istics, and should be judged on that basis. Unfortunately, they fell early into the hands of the ballyhoo artists. Many misconceptions regarding their value and possible applications, have gotten over to the lay people, who generally consider them satisfactory for household articles and gadgets but not for engineering material.

An Engineering Material

Plastics are an engineering material. They constitute a definite source from which to design our engineering equipment, and those of us who are in the general manufacturing and tool-making line should look upon plastics as just as important as the ferrous and non-ferrous materials.

It seems certain that within the next decade or two the plastics industry will be the equivalent of our present steel industry. It is inevitable with the developments that have taken place recently.

Indicating the origins of some of the plastic resins may be a help in giving background to the plastics picture, as well as offering a means of broad classification.

In the phenol-formaldehyde group, Dr. Bakeland brought together two

potent sterilizing agents — carbolic acid and formaldehyde to produce Bakelite. Phenol is the technical term for carbolic acid. When these two materials are brought together under proper conditions of temperature and pressure, this remarkable synthetic material called bakelite results.

The casein plastics form a large group, but should really be considered under the larger, more inclusive classification, particularly because of recent events. Casein belongs to the protein division — likewise the soy bean, and just recently, the coffee bean, which promises to do more for plastics than any other one development.

Coffee a Source

The potentialities of the coffee bean were discovered by a chap who worked in the coffee division of a national chain grocery for a number of years, striving to develop a plastic material from the coffee bean. He has been hired by the Brazilian Government, which expects to market in the next twelve months a half of the total amount of plastic materials heretofore produced and developed by all the firms put together. A price

of six or seven cents a pound compared with thirty or forty cents for other materials is contemplated.

The soy bean which Henry Ford has made famous, has been used miraculously for a car body.

In the cellulose division we have cotton and wood. When these are subjected to the action of various acids, and again, under proper conditions of temperature and pressure, there is formed a plastic resin.

The urea resins are interesting because they start with water and air and coal to form urea formaldehyde, and, in combination with an alpha cellulose, these three put together will result in a plastic material that is rather recent in origin but of tremendous importance to the entire field.

The vinyl resins are interesting because they start with air, natural gas,

set which is made of a bakelite material, that telephone set begins with phenol-formaldehyde resin. That, however, must be added to a so-called filler, and that filler may be wood pulp, any kind of cellulose pulp, textile material, fullers earth, asbestos or any number of similar materials.

The selection of materials of course depends upon the application, the economics of the situation, and a number of other factors.

Using Resins Alone

Some plastic products are produced directly from plastic resins. In other words, instead of adding a filler, plastic resinous material, with some few changes in its constitution and make-up, is used for casting directly in molds, generally of rubber.

In addition to those two forms of

But Tool Engineers are concerned largely with the problem of molding plastic materials into cast pieces. Let's consider methods of molding.

Molding Methods

A "well" is filled with a carefully weighed amount of plastic powder—resin — binder compound, and both the well and the force which will press the powder are heated with platens which in turn have heat supplied to them either by steam, hot water, or electricity. When the well is brought up against the force with sufficient pressure, the powder, which has gone into a plastic state, is molded. We have a plastic plastic. After a certain amount of curing time which depends entirely upon the material that is being used and the nature of the casting, the thickness and cross-section and so on, the mold is ready to be separated and the piece is ready to be ejected. No finishing ordinarily is necessary.

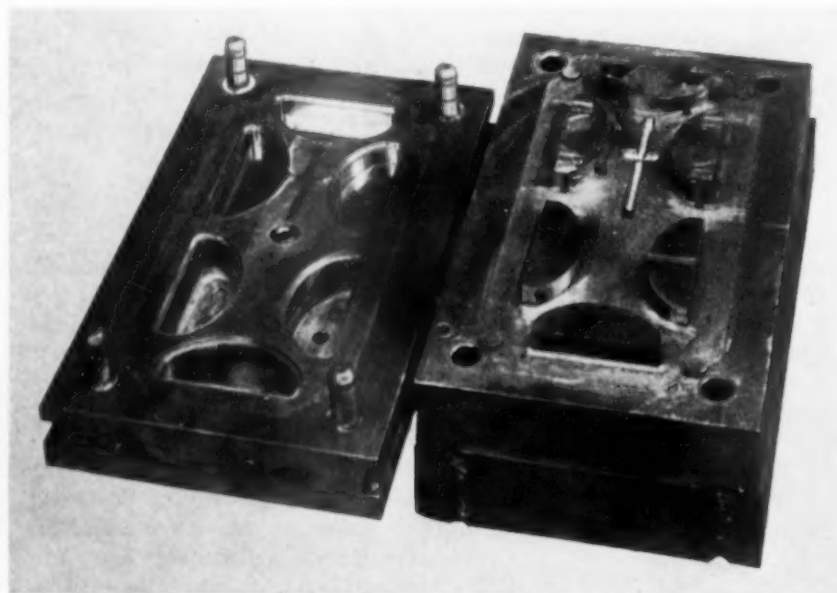
The injection or transfer molding method, of more recent origin, is coming to the front, probably to be preferred to the compression method. Plastic powder is fed into a heating chamber, which quickly reduces it to a plastic state. Pressure is then used to force it into the mold where it will form itself into the shape required.

Compression and injection methods largely constitute the molding processes used in the plastic field.

Time, Temperature, Pressure

Here are two examples of time, temperature and pressure factors in compression molding. In making refrigerator handles, both the well and the force are heated with steam platens. The well is brought up against the force and after probably five or six minutes of curing time for this type of casting, with pressures which will vary from 1500 to 2500 pounds per square inch, this casting is ready for use. The finish on the casting will depend on the finish in the mold.

On most telephone sets, temperatures will run to about 217 degrees Fahrenheit and the pressures are around 2000 lbs. per square inch. Those figures will vary with the kind of plastic material being used and above all on the castings. The cross-sectional area will influence, to a considerable extent, many of these factors.



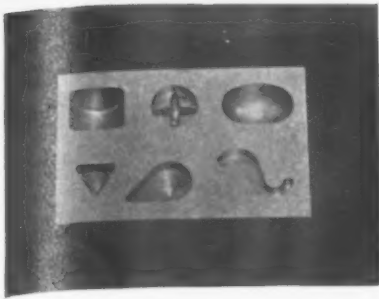
Well and force of dies used for casting of plastic army truck blackout filters. Here is an example of geometric figures which can be milled in horizontal plane on rotary head machine. Offsetting spindle on head creates two dimensional movement.

water, salt, and coal. These materials obviously are available in great abundance. The acrylic resins are of a petroleum derivative and go through some very interesting chemical changes, which are represented by the Tenite material which the Tennessee Eastman Company produces.

Binder and Filler

Any of these resinous materials may form the binder that goes into plastic castings. In other words, when you take hold of your telephone

plastic material—those that use the resin and the filler and those that use just the resinous material—there are the laminated materials. A sheet of paper, a piece of veneer wood, a piece of cloth is impregnated with any one of the plastic resins that we have just considered; sheet after sheet if piled together, put in a laminating press, and pressed into the desired thickness and referred to as laminites. These laminations are properly considered as making up a homogenous, uniform, integral piece of material.



Left—the various geometrical shaped cavities milled in the steel block were executed on a rotary head milling machine. Reverse block is shown being milled in the photo at lower right hand corner of this page.

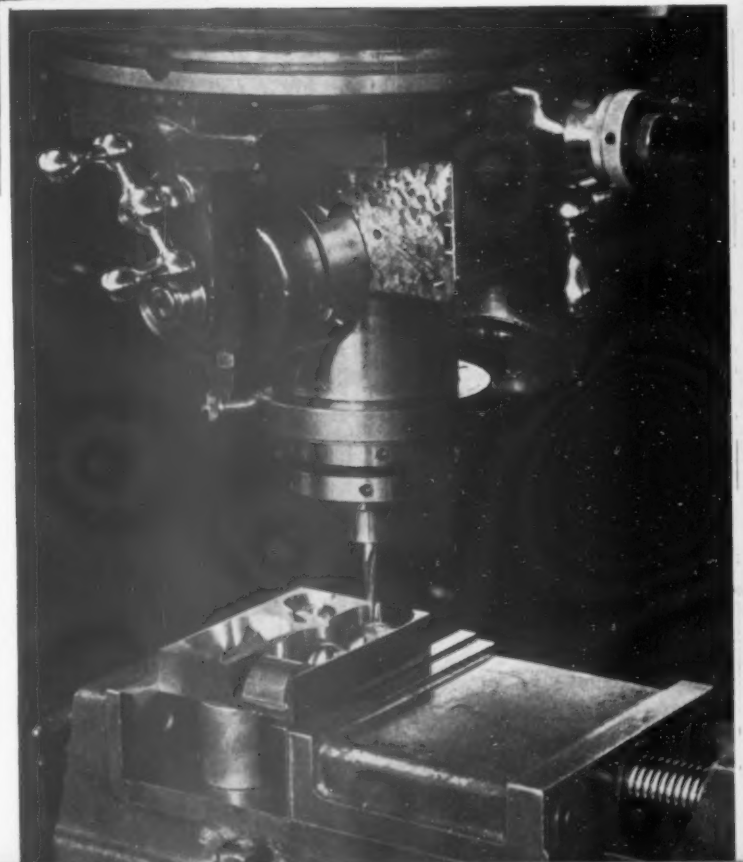


Above—processing die for an injection mold to produce plastic tail-light filters used for army truck blackouts. Precision equipment is required to hold the plastic casting to close limits. Each filter is subjected to a photo-electric test to hold light passage to 2% of the lamp's regular capacity.

Regular die-making equipment is used in making molds for plastics. Rotary head milling machine, at the left, looks like vertical knee and column type, but it provides a rotary movement to entire head. Offsetting spindle allows milling circular cavities in horizontal plane. Below, cherrying attachment on the rotary head permits milling cavities in the vertical plane. $\frac{1}{4}$ inch wall separates the cavities.

Mold - Making

The making of the mold is a phase of plastic work which vitally concerns the Tool Engineer. At the same time, it is the most important part of the whole plastic casting field. In other words, the ability of Tool Engineers to meet the problems of this field—as they relate to their profession—will facilitate the acceptance of plastics in more and more applications. At the same time, as plastics grow to greater prominence, Tool Engineering horizons will extend. Right now, molds for plastics are expensive. Their careful design and production are factors in economical production.



In the making of the mold, which is the phase of this plastic work that we are most vitally concerned with as Tool Engineers, we have two forged steel blocks, one of which will be the well and one of which will be the force. Some hammer work probably will have been done upon these two pieces.

The well must be machined so that the cavity will represent the part it is to make.

The making of the mold is the most important phase of plastic casting and hence should be carefully considered, beginning with the design of the product itself, and the industrial designer, if there is one, should work closely with the mold maker.

Mold Design

Let's consider such a product as a radio mast for an airplane, which is made symmetrical about a long axis. Though only one mold is necessary, a possibility in scattered instances, it brings out in its exaggerated form the point that careful consideration must be given to first designing the product and then designing and making the mold to produce economically the plastic casting. Molds are expensive seldom under a couple of hundred dollars, many times running into thousands of dollars.

A little care in the original design of a product to be made of plastic may save the cost of one mold.

Speeds and Feeds

In the machining of plastic materials speeds and feeds are practically identical to those used on aluminum.

Injection presses are rated according to the weight of the plastic casting. If there is more than one casting made in the mold at one time—in other words, if it's a multiple mold casting—the rating still refers to one piece. Thus a nine ounce injection press would refer to the weight of a single finished casting.

Mold making equipment is in an advanced state in this country and ready for anything that we may demand of it. Die construction is very similar to the die casting operation with which most Tool Engineers are familiar.

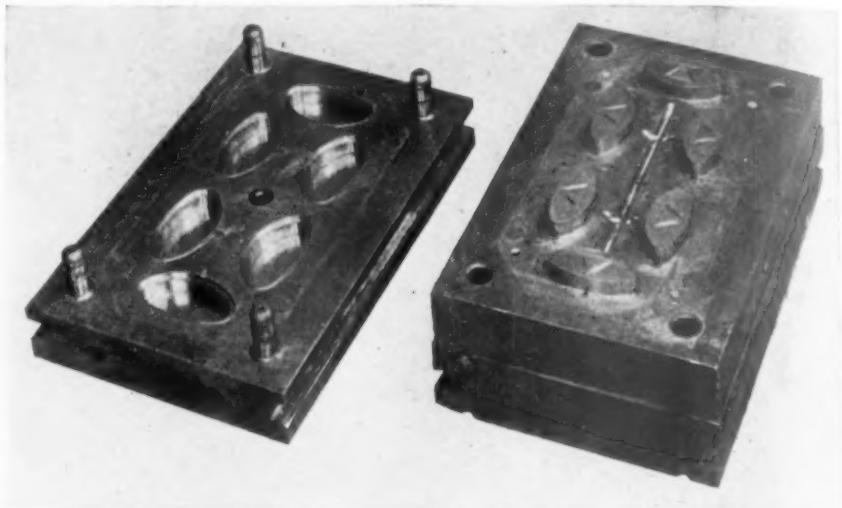
Before discussing the business of making these molds, it is important

to remember that plastics have some inherently good engineering characteristics. Let's examine briefly their qualities as compared with some ferrous and non-ferrous materials.

Tensile Strength

Plastics are dismissed by engineers generally with the statement that ten-

tic gear and a metal pinion or a metal gear and a plastic pinion are to be preferred to either two plastic parts or two metal parts. Gears of plastic materials that can be punched, molded, or machined, such as sheets of cloth impregnated with plastic resins, and then put into laminating presses, are satisfactory for some applications.



This particular well and force set of dies used for casting of plastic tail-light filter shows the gating down the center through which plastic is injected into the mold. Gates must be precisely milled because density of plastic is thus controlled. A 2% limit on light passage requires holding injection to close limit.

sile strength seldom runs above ten or twelve thousand pounds per square inch (though Du Pont's nylon tests up to 50,000 lbs. per sq. inch). Steel weighs five times and aluminum twice what plastics weigh. On the basis of specific tensile strength, plastics would run up to sixty thousand pounds to the square inch which would compare very well with steel and they would be equal and probably better than aluminum.

Elasticity

Concerning plastic's low modulus of elasticity—as low as five or six hundred thousand, don't overlook the indication of good resilient characteristics. These characteristics should force their attention on engineers for such application as gears and couplings. Plastic gears provide a silent operation, probably the reason for using them originally in the automobile. In addition to that, they are used now for larger engineering applications. They reduce starting torque, initial shock to equipment, and also the starting current.

In combination with metals, a plas-

Another interesting engineering application is a non-metal bearing which is formed of alternate layers of laminated plastic material and a metal spacer, put together in a holder.

A pulley with solid sheaves has been made out of highly shock resistant material by the Bakelite Corporation in order to overcome the objection that plastic materials break easily. Another application is the cap of an oil well bomb; the electrical wires go through the head and down to the detonator and, after the explosion the plastic material floats on the surface and does not present the problem that usual ferrous material presents. Of course, in the electric field, breaker arms are made of plastics because of the high dielectric quality.

Applications

An interesting engineering application that won the prize for the best engineering application in 1939 was a clutch body ring, such as is applicable to a machine tool.

A plastic part replaced a corroded automobile pump impeller, solving problem of corrosion.

When you get down to such things as the effect of acids, sunlight, and moisture, the plastic materials generally far out-shine the ferrous and non-ferrous materials, and can be a solution to the problems accompanying these conditions.

Ball bearing retainer rings have a natural application for plastics and are almost universally used.

Plastic washing machine agitator solved many problems met with aluminum. Because of the alkalies that are always present in washing operations, the aluminum was attacked, a difficulty overcome with plastics.

Self-Lubricating Material

Coupling problems have been solved interestingly. Plastic fingers holding two parts of a coupling together—an internal ring and external ring for example—induce noiseless operation, reduction of initial shock to equipment, and, of course, initial torque.

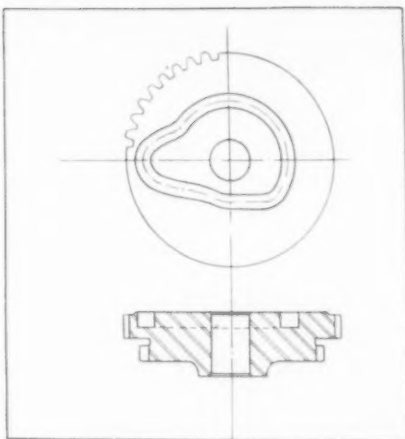
Until a few years ago, as you probably know, the problem of maintaining lubrication in roller neck bearings was an ever present one and almost insurmountable. The water that is necessary for rolling mill operations either entirely eliminated the lubrication that they tried to get into the bearings, or certainly reduced it to a very small percentage of effectiveness. In the use of plastics as a substitute in these bearings, the water that is used for the rolling mill operations is ideal for lubrication.

Inherently, the plastic is practically a self-lubricating material, almost entirely effected or completed with the addition of a small amount of water.

Mold-Making Equipment

Mold making for plastic castings is the most important part of the whole plastic casting field. One of the best known machines for the making of a mold for plastic castings where a model is necessary is the Gorton Pantograph. The cutter spindle reproduces exactly as the operator traces over the model with the tracer spindle. Of course the ratio can be stepped up and down with the pantograph.

On the hand-operated Gorton duplicator, a further step in the making of molds, the operator is able to control the vertical and horizontal movements of the tracer spindle and the



This illustration presents a master cam that was milled from a solid in the remarkable time of 7 hours. Saving effected averages from 200% to 300%. Tolerance was held to .001, plus or minus. All radii were tangent, no filing needed.

cutter spindle by means of two levers.

The Keller automatic duplicator, also using a model, provides another method of mold making. By means of electric buttons the operator can control all the movements of the tracer spindle necessary to profile the cavities and contours of the model.

Rotary Head

A rotary head tool and die milling machine, produced by the Kearney & Trecker Corporation, presenting another method of making molds, does not require a model. The rotary head, a circular way graduated in degrees, can be driven by hand or power. The spindle is separately driven and can be rotated from 240 revolutions per minute to 6000 revolutions per minute. In addition to this, the spindle can be offset from the center of the rotary head. Hence with the two movements, namely, of the rotary head and the spindle (offset four inches) it is possible to mill a circle eight inches in diameter. In other words, with the rotary head revolving in a horizontal plane and carrying the spindle which is offset—that combination of movement makes possible the milling of a circle in the horizontal plane. In addition, the rotary head can be set at any pre-determined angle and the spindle can be fed across at that angle in a straight line. And so it is possible to mill combinations of arcs, straight lines, and angles. Thus, any of the plane geometrical figures can be produced in the horizontal plane. Furthermore, a cherrying attachment applied to the spindle gives it a circular movement in the vertical plane. The spindle can be made to rotate in this plane, and to mill a circular groove in a steel block



in a vertical plane. If we combine that movement with the rotary head movement, in other words engage the feed and thus revolve the head slowly in a horizontal plane, and at the same time revolve the spindle in a vertical plane, obviously a spherical cavity can be milled. Furthermore, the cherrying attachment can be set so that the spindle will mill a plane surface at any desired angle, and with those combinations, cavities such as pyramids, cones, and the well known solid geometric figures can be milled.

Further Applications

Some applications of this machine include the making of molds for rubber gaskets and conversion of a die cast mold to one used in molding a plastic pneumatic hammer case. The processing of a mold like this with the rotary head method is obviously relatively simple. The necessary shifting of the rotary head center is merely a matter of table movement, and then the off setting of the spindle an amount equal to the radius of the cavity required is easily accomplished by the various adjustments provided in the head itself.

A mold for a plastic watch case was made with this type of equipment—again, a relatively simple and inexpensive operation with the rotary head method.

Tail-light Filters

An injection mold for army truck tail-light filters presented a problem in gating, though the actual milling out of the cavities of the mold was a simple job with the rotary head machine. But it was necessary to use this type of precision equipment in order to hold the plastic casting to close limits. Each plastic filter is subjected to a photo-electric test in order to determine the exact amount of light passing through. If more than two percent is allowed to pass through, as I understand it, a blackout condition so far as the enemy is concerned does not prevail. If two percent or less passes through; it's in effect a virtual blackout as far as the enemy is concerned. So the making of these molds to very close limits was necessary be-

specifications, not only so far as the dielectric characteristics of the material itself are concerned, but particularly the physical measurements, the tolerances to which a plastic casting like this must be held. It is made of a plastic rubber, probably an asbestos filler, and is, a hand molded job using electricity instead of hot water or steam in the platens in order to prevent the possibility of getting even the smallest amount of moisture into the finished part which would, of course, reduce the dielectric characteristics. This is one of the important considerations in this particular application.

The mold is an entirely hand operated job. The well is first fitted up with metal inserts. Then, after the inserts are put in, little pieces of plas-

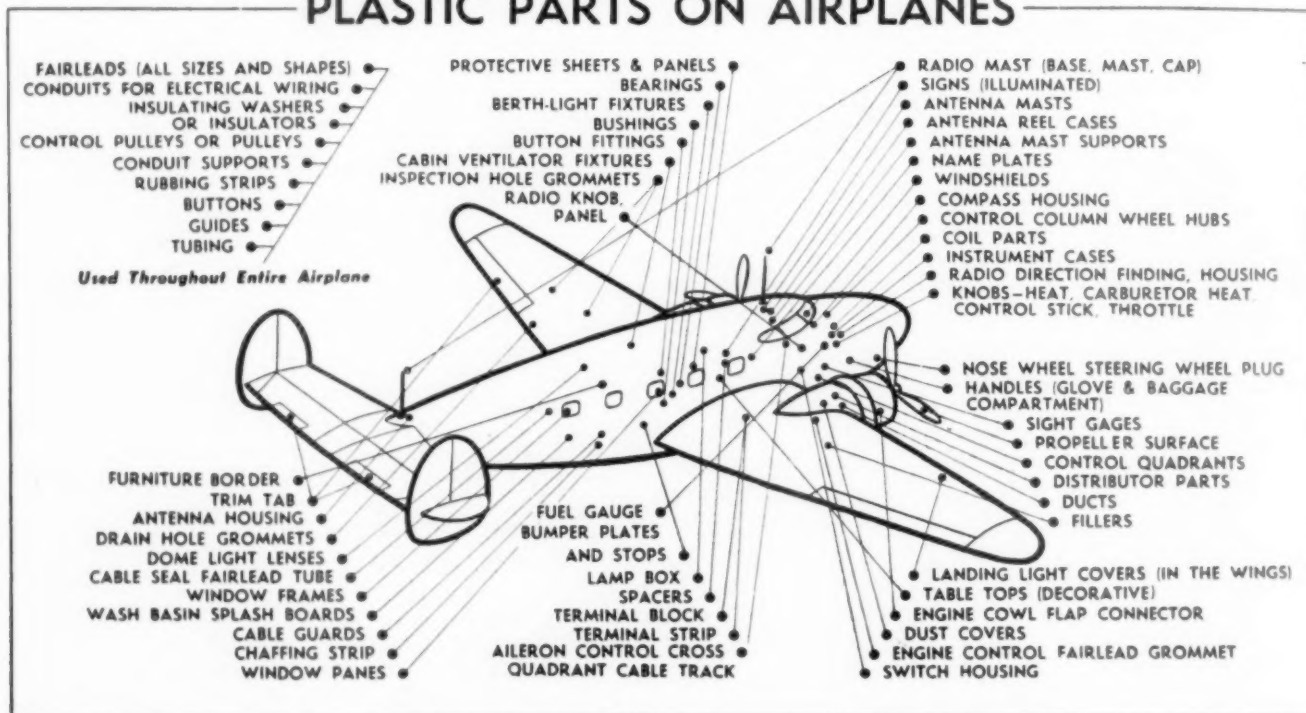
is necessary only for equipment of this kind, and is possible only where price is no consideration, as obviously, it is not for so important a part as a distributor head in an airplane engine.

The rotary-head type of equipment is versatile, and can be used for other work than the making of molds and dies. It is essentially a tool room piece of equipment to start with, and does a beautiful job of tool making, particularly jobs that partake of the nature of jigborer work. Forge dies and stamp dies are all, generally speaking, easily and economically made on this type of equipment.

Hobbing Method

A secondary method in the making of molds for the plastic field is the so-

PLASTIC PARTS ON AIRPLANES



CHART— COURTESY OF E. I. DU PONT DE NEMOURS & CO. (INC.)

cause the thickness of the plastic and its density would, of course, control the light passage.

The mold for the plastic distributor head for the 18-cylinder Pratt & Whitney engine offers an unusually interesting example from the standpoint of product application and manufacture. The Scintilla Division of the Bendix Corporation have standardized on the equipment for making this type of mold which, of course, must meet extremely high

plastic rubber, cut off in little chunks and carefully weighed out, are added to the well. The force is then put in its place, the two parts clamped together and put in to a press, and after a curing time of some ten minutes, the molds are opened, the parts are taken out and put onto a long conveyor and run through what amounts to a heat-treating operation over a period of thirty-six hours for a secondary curing operation. That is, of course, entirely unusual in the plastic field. It

called hobbing method. The hob must be machined in some fashion suitable for the application. Then that hob, made of die steel, is pressed into a block of steel to form a cavity similar to the hob itself, and the mold is then used to make a plastic cavity. The pressing of this hob into the block of steel is accomplished in a press. Of course, it's making of the hob that is of the first importance, and that can be accomplished with the rotary head machine.

Definite formulae and rules to assist in design
of dies for production of perfectly rounded parts

Making Circular Parts of true diameter in power presses

Stanley R. Cope

Acme School of Design
South Bend, Indiana



"The success of the operation depends
on formulae and tricks."

ONE of the most common forms of stampings the designer is called upon to design dies for are clamps, or similar circular parts. A typical part is shown in Figure 1. These parts come in an unending array of diameters, stock thicknesses, and ear shapes. Most designers are as familiar with the method of fabricating them in power presses as they are with the parts themselves. It would be rare, indeed, to find even a small press shop that did not have at least one part of this general form being fabricated in their presses.

Importance of First Forming Die

What the average designer doesn't know, however, is that to produce perfectly round parts, it is necessary to layout the shape to be formed by the first forming die from definite for-

mulae and rules. Lack of this knowledge is evidenced by the unsatisfactory parts usually produced. These range from parts that are visually satisfactory, but are dimensionally in-

accurate, to parts that have pronounced humps around their periphery. It is not uncommon to find some that are "squash" or "egg-shaped."

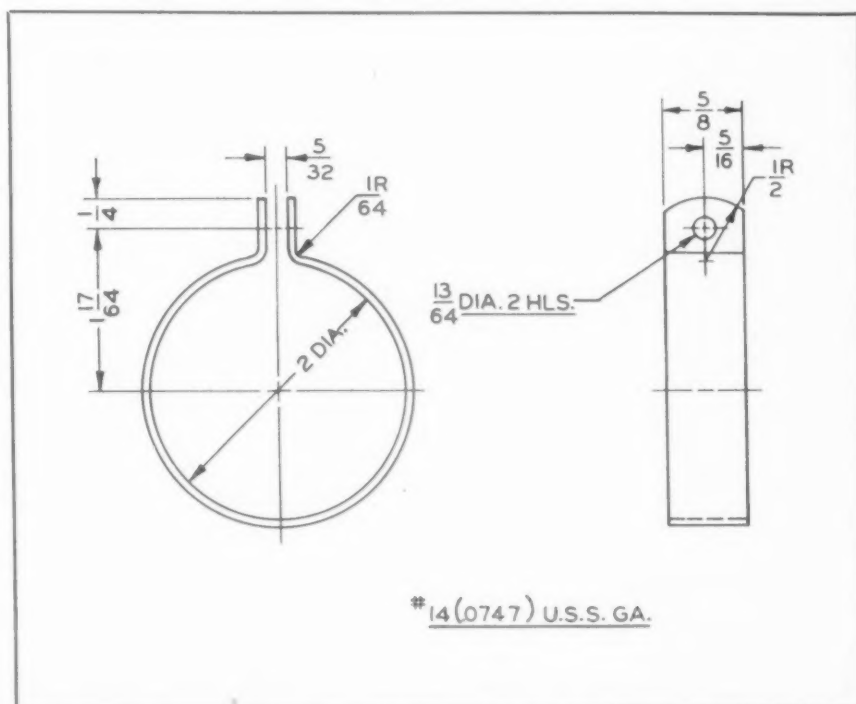


Figure 1—Design of a typical rounded part to be formed in a power press. Accuracy of dimensions of parts in production depends upon layout of shape to be formed by first forming die.

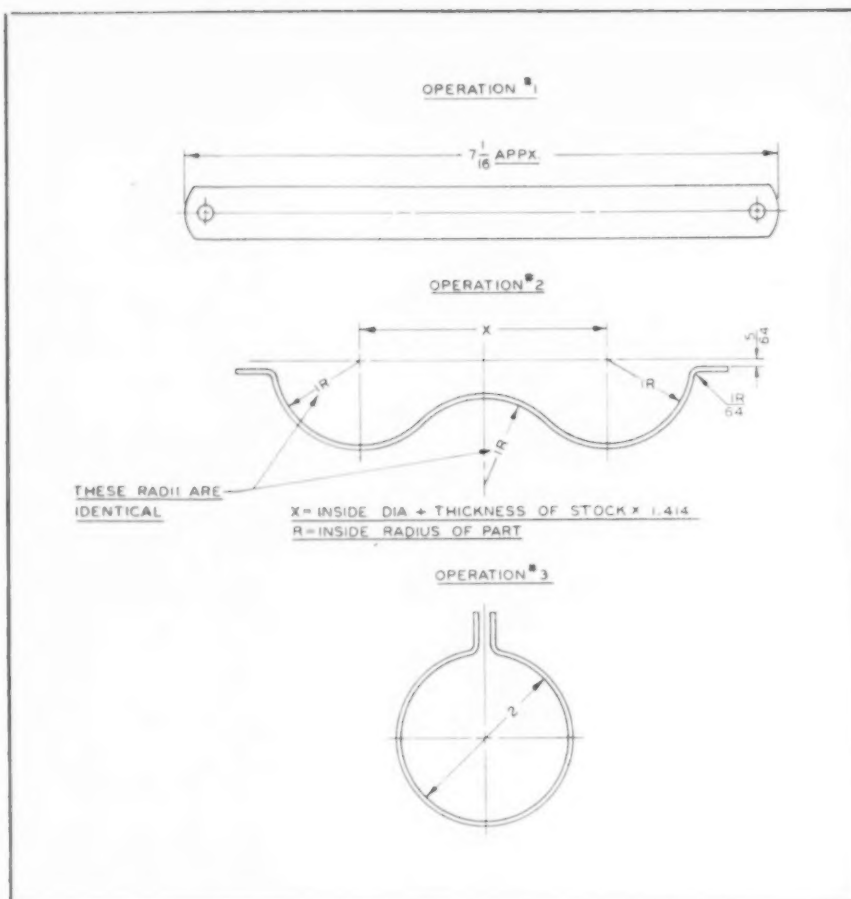


Figure 2, above, shows three operations, blanking, and first and final forming, required to produce part.

The usual and most effective way to produce these parts is by means of three operations as shown in Figure 2. The first operation pierces and cuts off the blank to the correct length. The die used in this operation differs in no way from the ordinary parting-type cut off and pierce die, excepting that a spring-backed pusher bar should be provided to push against the front edge of the strip. This keeps the stock up against the back gage and plays no small part in helping to keep the pierced holes the same distance apart on all pieces. Stock pushers are among the most common die accessories, but are often considered unnecessary and are not included in the design of many cut off dies.

Design of Cut-off Die

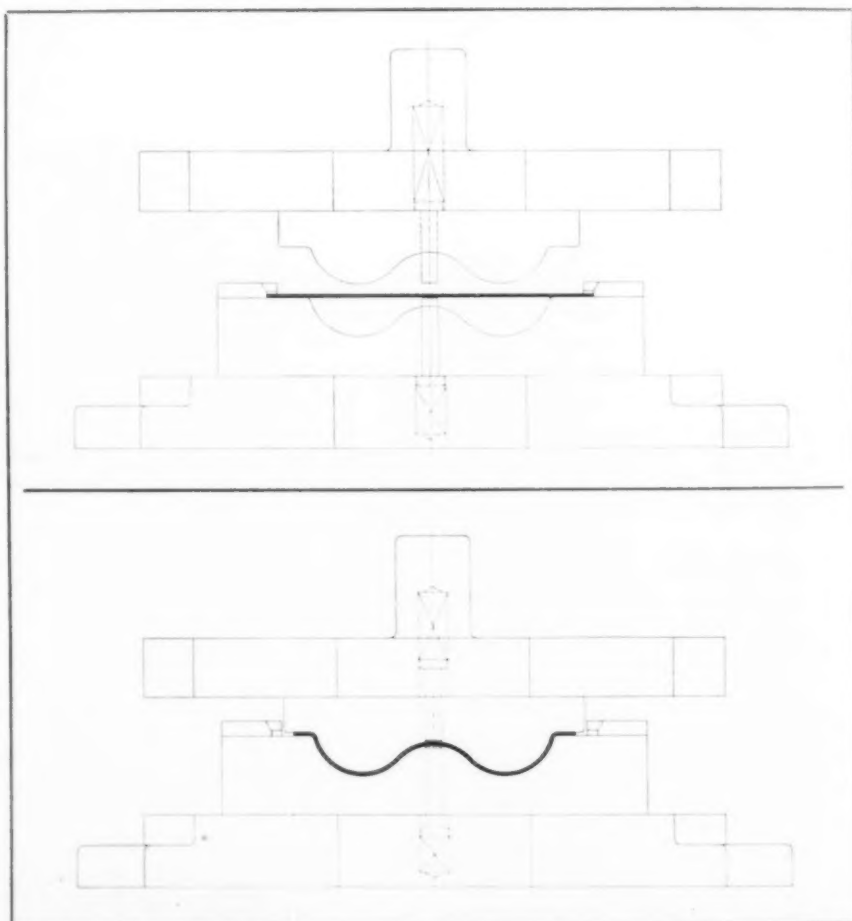
Another suggestion in the design of the cut off die is to be certain that the piercing punches enter the stock before the parting punch strikes. This prevents the punch from parting the strip first, causing the blank to jump

away before the piercing punch can contact. The result may be serious discrepancies in hole spacing between different blanks. Careful attention must be paid to these details because the blank must undergo two forming operations, after which the holes are expected to be reasonably in line.

Lay-out

In laying out the part for the first forming operation, the distance X and the radius of the central hump must be in correct proportion to the diameter of the part. The distance X is found by taking the sum of the inside diameter of the part, plus one stock thickness and multiplying by 1.414. The radius of the hump as shown on the layout must be the same as the inside radius of the clamp to allow just the right amount of material to form the part. The portions outside the dimension X must con-

Figures 3 and 4, below, show the open and closed positions of the simple, solid type die that performs the first forming operation.



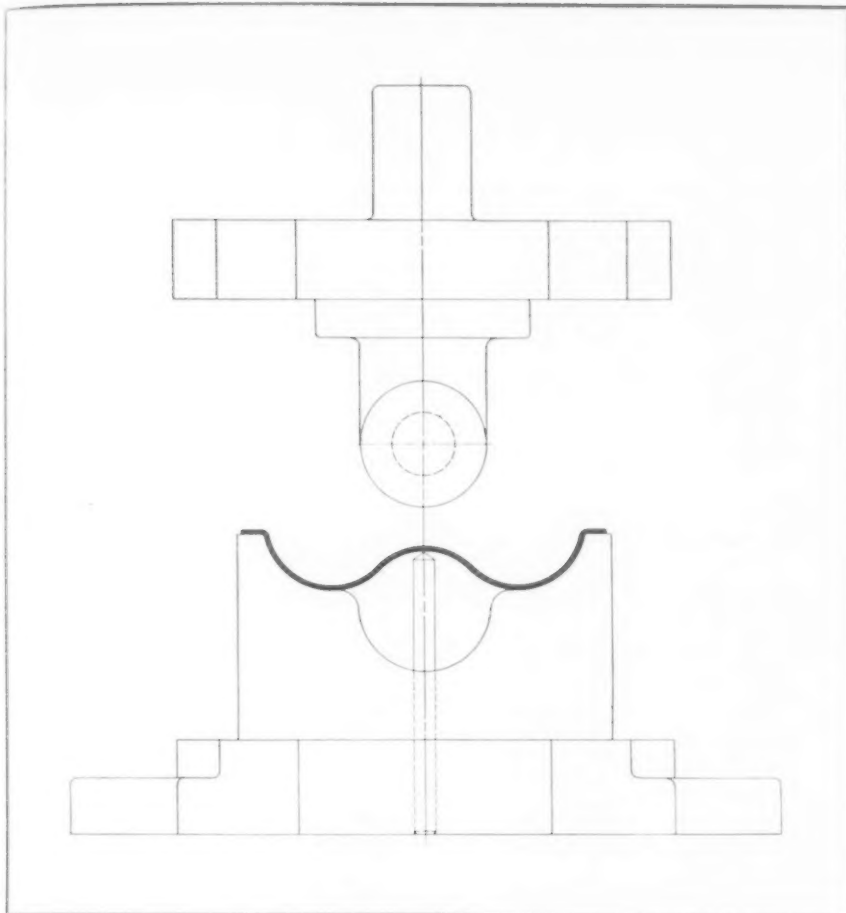


Figure 5, above, the die steel, as can be seen, is shaped to conform to the part as shaped in the first forming operation.

form to the exact shape of the finished part, excepting spring back allowance for the ears which often is necessary. This detail is taken care of by the die-maker after several trial bends and ordinarily does not enter into the designer's figures on the operation layout.

Machining the Die

Figures 3 and 4 show the open and closed positions of the die that performs the first forming operation. It is of the simple solid type, the punch and die being carefully machined to the correct form from specifications from the previously prepared operation layout. The blank is placed into solid type gages of sufficient thickness cold-rolled steel to permit actual contacting surface equal to $1\frac{1}{2}$ stock thicknesses, and liberal depth of leading angle which should measure 30° from the vertical. Gages so constructed permit them to "swallow" the blank, adding greatly to increased production and freedom from trip-

ping the press with the blank not completely in them.

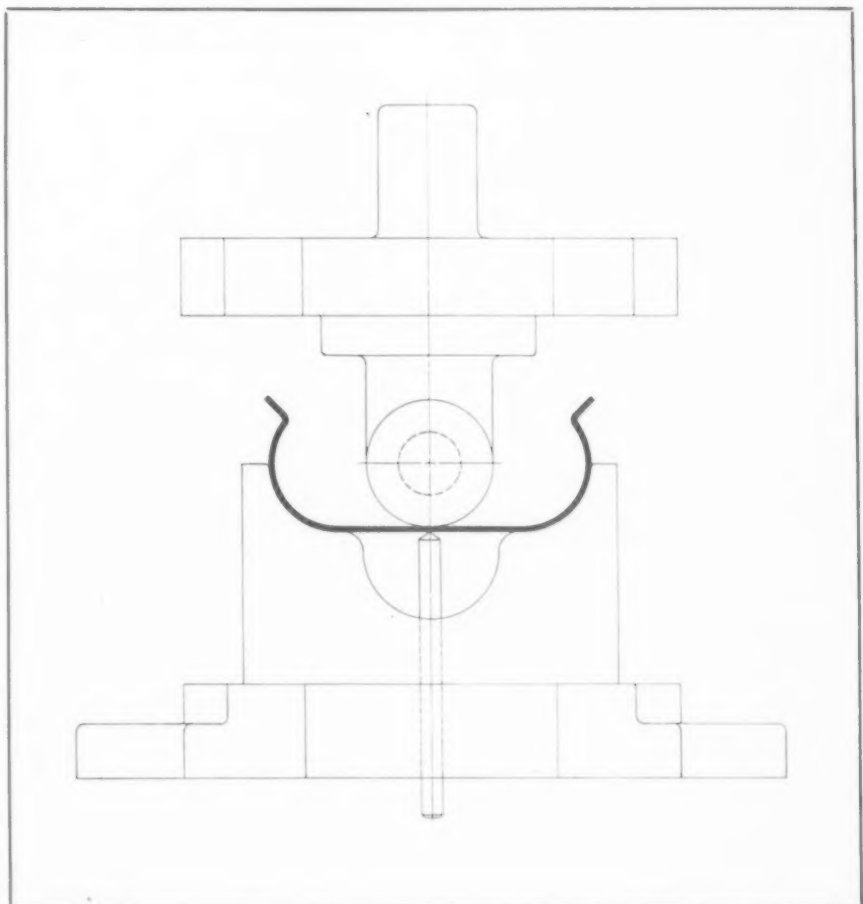
Locate Pins Accurately

Plain pins grouped to serve as a nest for the blank, or low, flat gages should be avoided on operations of this type. Pins for the former must be located accurately and do not permit of being temporarily located like the solid type until the correct length blank can be determined by trial. The latter, or low gage, often used to avoid the need for providing clearance in the punch steel (usually a few thousands less than the stock thickness in height) are difficult to load. Much trouble is caused by the blank jumping out of them from the jar of the press, permitting the punch to strike while the blank is on top of them.

Gage Distance

Careful attention should be paid to the distance the gages are allowed to

Figure 6, below, the importance of this conformation in final forming is aptly illustrated. The piece is being "steered" by the curling action until the center hump straightens.



extend along the front and back of the blank. This distance should be enough to insure perfect positioning but should be short enough to permit the blank to be pulled completely out of them during the forming operation. This permits of swiftly brushing the formed blank from the die with the new blank without interference from the gages. A long, narrow die set should be selected for this operation. Guide pins should be far enough apart to allow the formed blank to pass between them, and not cause production to be slowed down by periodically stopping the press to clear the die of trapped parts. Careful attention to the foregoing details will materially add to production and safety of operation.

Gripper Pins

Gripper pins are provided as shown to prevent the blank from slipping which would cause the two ends to move unevenly. The spring backing up the upper pin must be stronger than the lower spring to enable it to push the latter down out of the way before the bending action takes place. The upper pin also serves to shed the formed blank from the punch in the event that it sticks by oil adhesion or other causes.

Final Forming

Figures 5, 6 and 7 show the final forming operation in varying positions of the press stroke. Referring to Figure 5 it will be noted that the die steel has been shaped to conform to the part as it comes from the first forming operation. Herein lies the main "secret" of successfully producing truly round parts. This form not only serves as a nest, but during the final forming operation serves to curl or otherwise protect that portion of the circle formed in the preceding operation. How it accomplishes this is shown in Figure 6, which shows the previously formed portion being "steered" by the curling action until the center hump is straightened out and the punch is ready to form the lower half of the clamp.

Stripping Part from Horn

Figure 7 shows the operation completed. The part is carried up with the punch and is ordinarily stripped from the horn by hand. The usual practice is to load the die with the left

hand while the right is engaged in removing the completed work. Open parts of the type under discussion spring slightly and can ordinarily be expected to strip easily. However,

ever, and the success of such operations depends upon the formulae and tricks (like the curling in the final operation) used, and not just the visual experience of seeing the opera-

The Crib—page 166—starts in this issue. Turn to it regularly. It will stock practical ideas, kinks and shop shortcuts for Tool Engineers.

some companies prefer using a cam operated ejector that automatically rolls the work off the horn as it approaches the top of the stroke. The advantage in the use of such a device chiefly concerns additional safety to the operator. A gripper pin operated by suitable spring or air pressure assures an equal distribution of metal to both sides of the clamp.

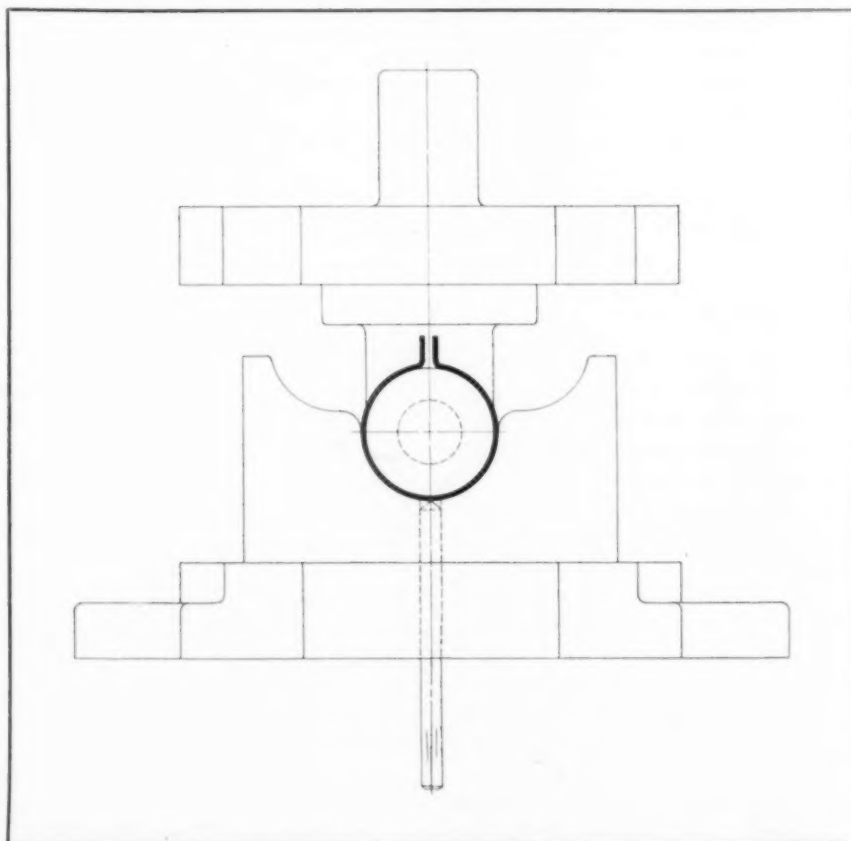
The forming dies are sometimes inverted and used in horn presses to provide clearance for unusually long ends. The principle is the same, how-

tion performed in some factory.

The use of correct formulae and instructions as herein given should produce circular parts to the proper shape and size intended by the product designer.

An alternate way of making circular parts, where unusually close alignment of holes is required, or there is danger of distorting them in the first forming operation, is to cut the blank to length, put it through the first forming operation, pierce it, and then finish form it.

Figure 7, below, shows the completed operation in forming a rounded part on a power press. The piece coming off the first forming die has been protected throughout this forming process, until the perfect circle has been completed.



Tool Engineering DATA SHEET

Thread Forms and Formulas

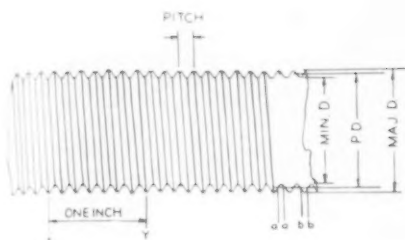


FIG. 1 Thread Cutting Terms

MAJOR DIAMETER—THE LARGEST DIAMETER OF THE THREAD OF EITHER THE SCREW OR THE NUT.

MINOR DIAMETER—THE SMALLEST DIAMETER OF THE THREAD OF EITHER THE SCREW OR THE NUT.

PITCH DIAMETER—ON A STRAIGHT SCREW THREAD, THE DIAMETER OF AN IMAGINARY CYLINDER, THE SURFACE OF WHICH WOULD PASS THROUGH THE THREADS AT SUCH POINTS AS TO MAKE EQUAL THE WIDTH OF THE THREADS AND THE WIDTH OF THE SPACES CUT BY THE SURFACE OF THE CYLINDER. IN FIGURE 1 THE LINES REPRESENTING THE DIAMETER "PD" ARE LOCATED SO AS TO MAKE SPACES "aa" AND "bb" EQUAL. ON A 60° VEE-TYPE THREAD AND ON NATIONAL FORM THREADS, THE PITCH DIAMETER IS SIMPLY THE MAJOR DIAMETER LESS THE DEPTH OF THE THREAD.

DEPTH OF THREAD—ONE-HALF THE DIFFERENCE BETWEEN THE MAJOR DIAMETER AND THE MINOR DIAMETER. IN LATHE WORK, THE DOUBLE DEPTH OF THREAD, WHICH IS THE DIFFERENCE BETWEEN THE MAJOR AND MINOR DIAMETERS, IS A QUITE COMMON TERM. THUS, KNOWING THE MAJOR DIAMETER REQUIRED, SUBTRACTING FROM IT THE DOUBLE DEPTH OF THREAD FOR THE REQUIRED PITCH, GIVES THE MINOR DIAMETER.

PITCH—THE DISTANCE FROM A POINT ON A SCREW THREAD TO A CORRESPONDING POINT ON THE NEXT THREAD, MEASURED PARALLEL TO THE AXIS (SEE FIG. 1).

$$P = \text{PITCH OF THREAD IN INCHES} = \frac{1}{\text{NUMBER OF THREADS PER INCH}}$$

THREADS PER INCH—THE NUMBER OF COMPLETE THREADS IN THE OF ONE INCH. IN FIGURE 1 THE DISTANCE BETWEEN POINTS X REPRESENTS ONE INCH, AND THERE ARE SEVEN THREADS PER INCH.

$$N = \text{NUMBER OF THREADS PER INCH} = \frac{1}{\text{PITCH}}$$

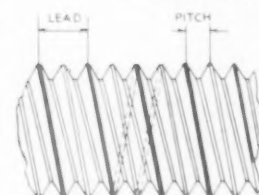


FIG. 1A Double Screw Thread

LEAD—THE DISTANCE A THREAD ADVANCES AXIALLY IN ONE TURN. ON A SINGLE SCREW, THE LEAD AND THE PITCH ARE IDENTICAL. ON A TRIPLE-START SCREW, THE LEAD IS THREE TIMES THE PITCH, ETC.

FIGURE 1A SHOWS A DOUBLE-START SCREW. THERE ARE SEPARATE GROOVES OR HELICES AROUND THE SCREW, EACH OF WHICH ADVANCES TWICE THE PITCH IN A SINGLE TURN. IF THE PITCH OF THIS SCREW IS 1/4, THE LEAD IS 1/2 INCH.

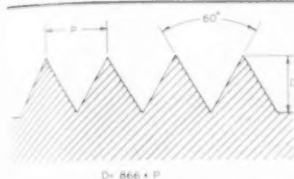


FIG. 2 60° Sharp Vee Thread and Formula

CUT VERY SELDOM, USUALLY FOR SMALL SCREWS ON WHICH THE FLAT AT THE TOP AND BOTTOM OF THE V-THREAD WOULD BE SO SMALL THAT IT APPROACHES THE V FORM.

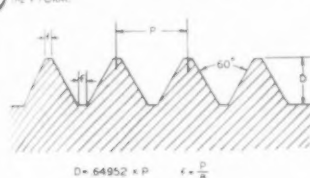


FIG. 2A Metric Standard Thread and Formula

ACCEPTED ALMOST UNIVERSALLY WHEREVER THE METRIC SYSTEM IS THE STANDARD OF MEASUREMENT, ANGLE AND FORM IS IDENTICAL TO THAT OF THE NATIONAL FORM THREAD. LATHE MUST BE EQUIPPED WITH METRIC-PITCH THREADS FOR CROSS AND COMPOUND FEED SCREWS AND FEED SCREW COLLARS GRADUATED IN MM.



FIG. 2B Tool for Cutting Internal 60° Threads

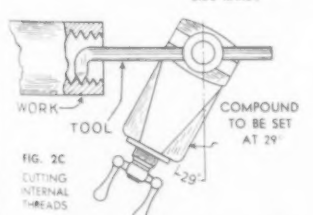


FIG. 2C Cutting Internal Threads

60° V-TYPE

60° SHARP VEE THREAD

NATIONAL FORM OR AMERICAN NATIONAL THREAD

METRIC STANDARD THREAD

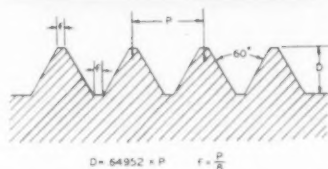


FIG. 2D National Form Thread and Formula

THE NATIONAL FORM OR AMERICAN NATIONAL SCREW THREADS (NATIONAL FINE AND NATIONAL COARSE) ARE PRACTICALLY STANDARD FOR AUTOMOTIVE AND MACHINE SHOP WORK IN THE UNITED STATES. THESE THREADS ARE 60° VEE THREADS WITH THE POINTS CUT OFF SO THAT THE DEPTH IS 75% OF THE DEPTH OF A VEE THREAD OF THE SAME PITCH.



FIG. 2E

THE NATIONAL FORM NUT FITS SCREW CUT WITH 60° SHARP VEE TOOL. SCREW HAS REGULATION VEE BOTTOM, BUT TOP IS LEFT WITH PROPER AMOUNT OF FLAT.

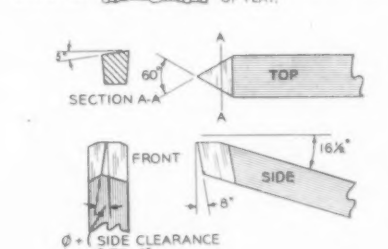


FIG. 2F Tool for Cutting 60° V-Type Threads

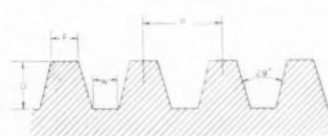


FIG. 5 Acme Screw Thread and Formula

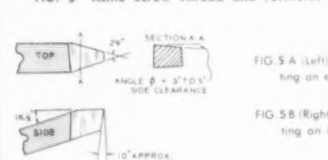


FIG. 5A (Left) Tool bit formed for cutting an external Acme thread.



FIG. 5B (Right) Tool bit formed for cutting an internal Acme thread.

ACME

OFTEN FOUND IN POWER TRANSMISSIONS—ALSO IN LEAD SCREWS AND FEED SCREWS OF PRECISION MACHINE TOOLS.

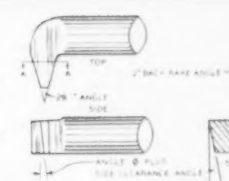


FIG. 5A (Left) Tool bit formed for cutting an external Acme thread.



FIG. 6 Square Thread and Formula

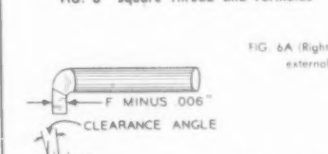


FIG. 6A (Right) Tool bit for cutting external square thread.



FIG. 6B (Left) Tool bit for cutting internal square threads.

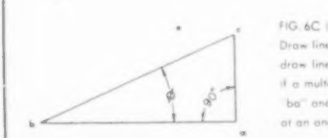


FIG. 6C (Left) Determining the angle ϕ for grinding tools for cutting square. Draw line "ab" equal to the circumference of the thread (3.1416 x major diameter). Draw line "ac" at right angles to "ab" and equal in length to the thread pitch (if a multiple thread). Draw line "bc". The angle ϕ , equal to the angle made "ba" and "bc", is known as the angle of "helix". The leading side of the tool is at an angle equal to ϕ plus proper side clearance.

SQUARE

RARELY USED AND DIFFICULT TO CUT. FOUND OCCASIONALLY IN VISE AND CLAMP SCREWS AND OTHER SPECIAL SCREW FORMS.

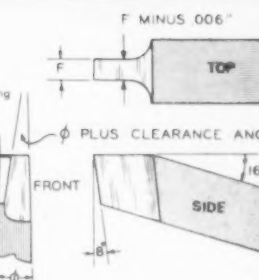


FIG. 6A (Right) Tool bit for cutting external square thread.

PIPE THREADS

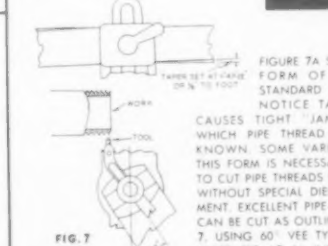


FIG. 7A

FIGURE 7A SHOWS EXACT FORM OF AMERICAN STANDARD PIPE THREAD. NOTICE TAPER WHICH CAUSES TIGHT "JAMMING" FOR WHICH PIPE THREAD IS SO WELL KNOWN. SOME VARIATION FROM THIS FORM IS NECESSARY IN ORDER TO CUT PIPE THREADS ON THE LATHE WITHOUT SPECIAL DIES AND EQUIPMENT. EXCELLENT PIPE-TYPE THREADS CAN BE CUT AS OUTLINED IN FIGURE 7, USING 60° VEE TYPE TOOL AND TAPER SET AT 1/8 INCH PER FOOT.

FIG. 7A American Standard Pipe Thread

WHITWORTH

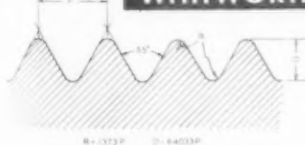


FIG. 3 Whitworth Thread and Formula

This form is standard in British Isles for nearly all types of threads.

BUTRESS

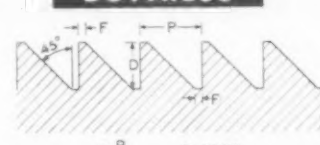


FIG. 4 Buttress Thread and Formula

Used in single-direction power transmissions—jack screws, vise screws, etc.

Courtesy—Atlas Press Co., Kalamazoo, Mich.

Tool Engineering DATA SHEET

A Few Important Suggestions On the Design of Threaded Parts

Many designs for threaded parts specify a full thread closer to the shoulder than is necessary.
Here are the manufacturing difficulties involved.

Threading close to a shoulder requires die chasers with short (45°, 35°, etc.) chamfers or throats.

Short chamfer chasers are special.

Accurate threads are more difficult to produce with short chamfer chasers.

The finish of the thread is not as good when cut with short chamfer chasers. This is especially true on stainless steel, chrome nickel and many other alloys.

When full threads are required very close to a shoulder, it is often necessary to rethread, thus adding to cost and slowing up production.

Hitting the shoulder when trying to cut close to the shoulder is the chief cause of chaser breakage and this means down-time and a waste of an important tool.

Chasers with short chamfers or throats have a greater tendency to chip or break when cutting. They also have much less chaser life per grind and require slower cutting speeds.



Hitting shoulder when trying to thread close to shoulder is chief cause of chaser breakage.

When using short chamfer chasers, less production is obtained, not alone from the slower cutting speeds, but due to the down-time from changing chasers frequently. More scrap is obtained because of the poor finish when using chasers having short chamfers.

This information was assembled by the Die Head Manufacturers of this country.

Whenever possible, do not specify full threads closer to the shoulder than 2½ or preferably 3 threads. Make it possible to use chasers with chamfers at least 2½ threads long for efficient cutting.

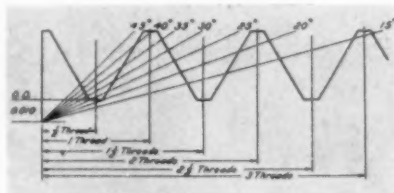


Chart showing number of threads chamfered on chasers for different chamfer or throat angles.

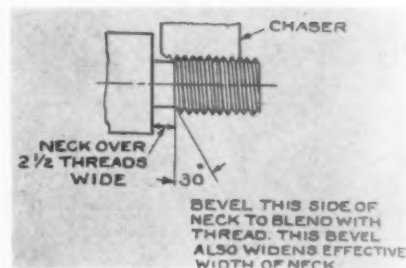
The more threads intersected by the chamfer or throat, the better the distribution of chips. This means better finish on the work and longer chaser life.

TABLE SHOWING CHIP THICKNESS FOR DIFFERENT CHAMFERS OR THROATS

Chamfer or Throat Angle	Chip Thickness
45°	.0177
30°	.0125
20°	.0086
15°	.0065
12°	.0052
10°	.0043

Based On 10 Pitch A.N. Form

Where screws must be screwed into tapped holes close to the head, the screw should be necked or recessed as shown in the illustration. The neck will not materially weaken the screw, because the bottom is only slightly below



the root diameter of the thread. A bevel of 30° on the thread side of the neck, as shown in the illustration, is recommended. The thread will blend better with the neck, not only improving the appearance, but also permitting longer chamfers on the threading tools.

Another way in which to avoid threading close to a shoulder is to counterbore, or at least countersink the tapped hole, or use washers.

Where screws requiring full threads close to a shoulder are already in production, the design can be changed to permit a neck or recess, or a wider neck than formerly used, without interfering with the interchangeability of the parts.

Another condition that is hurting the war program is the hundreds and hundreds of special thread sizes that are specified. Such special sizes require, in addition to special chasers, special taps and special gages. This not only means extra expense, but often times many months are lost in getting into production.

Thread sizes should always be selected from National Bureau of Standards Handbook H-28 1942 (Screw Thread Standards for Federal Services).

NOTE: On this and the preceding page are the eighth and ninth of a series of Data Sheets to be published in THE TOOL ENGINEER. A handy three ring binder can be secured at any book, stationery, or dime store and will hold the sheets for frequent reference.

Eight applications of a new
tool for positive inspection

Optics

applied to machining operations

By D. L. BENTON



Figure 1—Inspection on the job

THE current insatiable demands for increasing production and accuracy bring optical locating and measuring methods into sharp focus. Set-up in every machining operation is time consuming, nerve wracking, and every step is a pitfall of possible error. The optical method, as now available and embodied in a rugged machine-shop device, strikes at the heart of the set-up problem by rejecting the source of the error. It may rightly be considered as a significant contribution to industrial America's titanic effort in this present emergency.

A Shop Tool

The Variable Center Scope (See Fig. 1) is *not an optical laboratory instrument*. It is a shop tool, far less delicate than the traditional precision measuring instrument, without a trace of the prima-donna in spite of its power to magnify forty-five times.

Moreover, the Center Scope goes to the job—not the job to the Center Scope. It is placed directly in the spindle of the machine and can be adjusted so that its guide lines are centered exactly in line with the machine-spindle. Thus, runout in the chuck, adapter, or even in the spindle is cor-

rected—obviously the first step in assuring accurate setup.

This so-called "trimming" of the Center Scope is easily and quickly accomplished using the trimming screw (See Fig. 1) to tilt a pivoted prism. The procedure for trimming will be plain from the following explanation in connection with sketch Fig. 2. Line A-B represents the center line of the machine spindle. Due to run-out, for example in the chuck used to hold the Center Scope, line C-D represents the center line of the

Center Scope, or the center of its guide lines. Point D represents a reference line such as the line on an Edge Block (a sharp line formed by bringing together two oppositely lapped surfaces — see Figure 1) brought into focus and centered between the guide lines of the Center Scope. When the Center Scope is revolved through 180° by revolving the machine spindle, the guide lines now assume position D' separated from the reference line (Edge Block) by distance D-D'. The runout amounting to B'-D' is compensated by trimming the guide lines one-half of D'-D or D'-B'. If the reference line on the Edge Block is moved (by longitudinal table movement) one-half of D-D' or D-B', the guide lines in the Center Scope will be split by the reference line now located at B'. If the trimming has been done accurately, the Center Scope can be rotated through 180° , first to the right and then to the left, with the reference line (Edge Block) splitting the guide lines in the Center Scope. Obviously, the Center Scope guide lines at B' are now true with the machine spindle A-B.

Following pages explain, by pictures, diagrams and captions, the methods of applying the center-scope to machining operations.

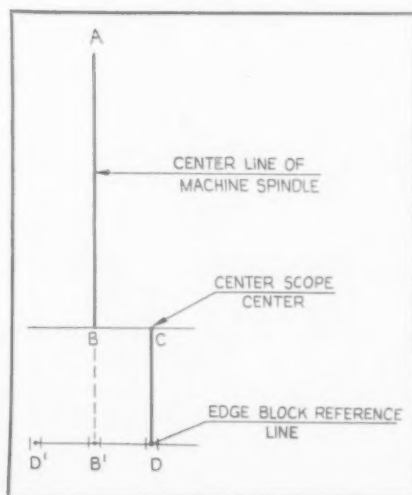


Figure 2—Trimming Center Scope

Optics -- Applied to Jig-Boring

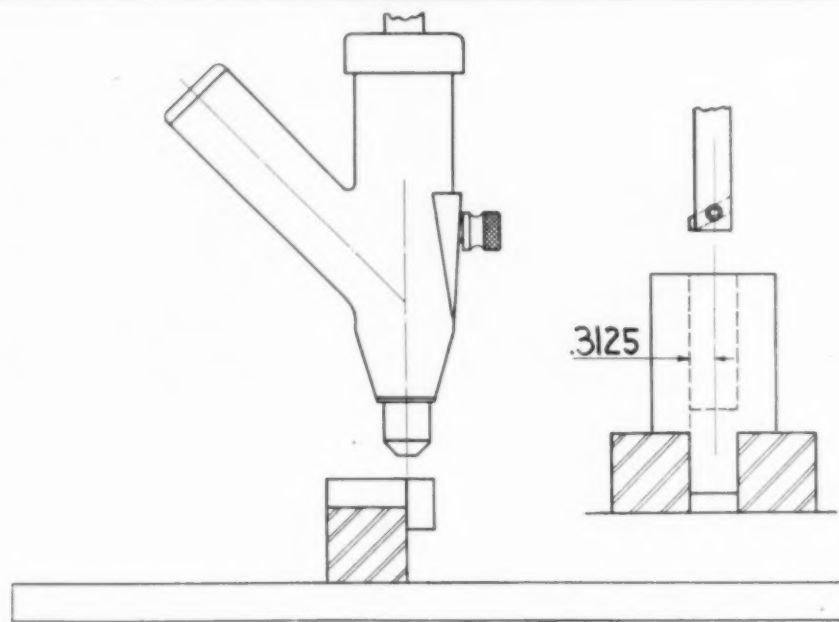


Figure 3—left—Job is to locate holes for re-boring a fixture. Edge Block is set on parallel. Center Scope set in spindle is checked for run-out (see Fig. 2). The spindle center is then set to correspond to face of parallel. Figure 4, right—Workpiece is set on parallels. Spindle is located for boring by moving table exactly half diameter of hole to be bored. Locating time: 2 minutes. Allowed tolerances: .005-inch. Actual tolerance: .0001-inch.

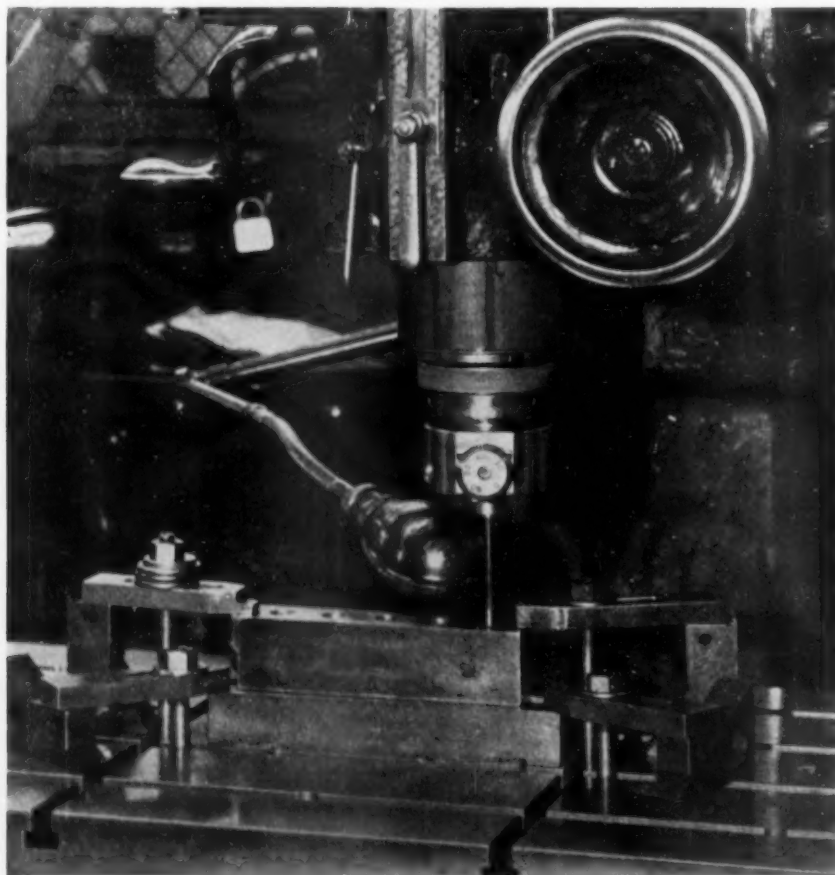


Figure 5—Work-piece, mounted on parallels, ready for boring.

Figs. 3, 4 and 5 show the re-boring of holes in rejuvenating a fixture. The fixture, mounted on parallels set up for boring on the table of a jig borer, is shown in Fig. 5. The following procedure using the Center Scope, brings the center line of the spindle in line with the center of the hole locations in the fixture.

After the guide lines have been trimmed for runout as previously explained, an Edge Block is set on a parallel as shown in Fig. 3. The parallel is aligned approximately with the table T-slots in the usual manner and lightly clamped to the table. With the Edge Block on one end of the parallel, the Center Scope guide lines, now corrected for runout, are split by the line on the Edge Block. Note that the machine spindle center now accurately corresponds to the face of the parallel. The Edge Block is moved to the other end of the parallel, and the Center Scope guide lines are split by the reference line (on Edge Block) by adjusting the parallel, which is now exactly parallel to the table travel.

In applying tools for positive inspection, such as the Center Scope, the inherent precision of the machine is fully released. Set-up accuracy is freed from the troublesome factor of the human element. On the Center Scope, the optical beam is inflexible and not subject to wear, temperature or variation due to pressure on the work-piece.

All that remains to complete this setup is to move the table crosswise a distance equal to 3.125-inch to bring the spindle center in line with the center of the fixture holes. The work-piece is set on the parallels by locating from the finished face as indicated in Fig. 4. The second parallel is now set in place and the entire assembly properly clamped to the table. When the Center Scope is replaced in the machine spindle by the boring tool, the setup is complete, accurate to within .0001-inch.

Optics -- Applied to Jig-Boring

To locate for boring hole exactly in diameter of bar

Figures 6 and 7 illustrate the application of optics to locating for boring a hole exactly along the diameter of a bar. A ground block is placed against the bar set in V-blocks as shown. After trimming the Center Scope for possible runout, the reference line on the Edge Block is made to split the Center Scope guide lines. Moving the table one-half the diameter of the bar brings the spindle center in line with the center of the hole to be bored exactly along the diameter. To properly locate this hole on the long axis of the bar, the Edge Block is set on its end as shown in Fig. 8. When the Edge Block reference line splits the Center Scope guide lines, the jig borer table is moved longitudinally the specified distance. The machine spindle is now located exactly over the workpiece center for the boring of the specified hole. The final setup is shown in Fig. 9.

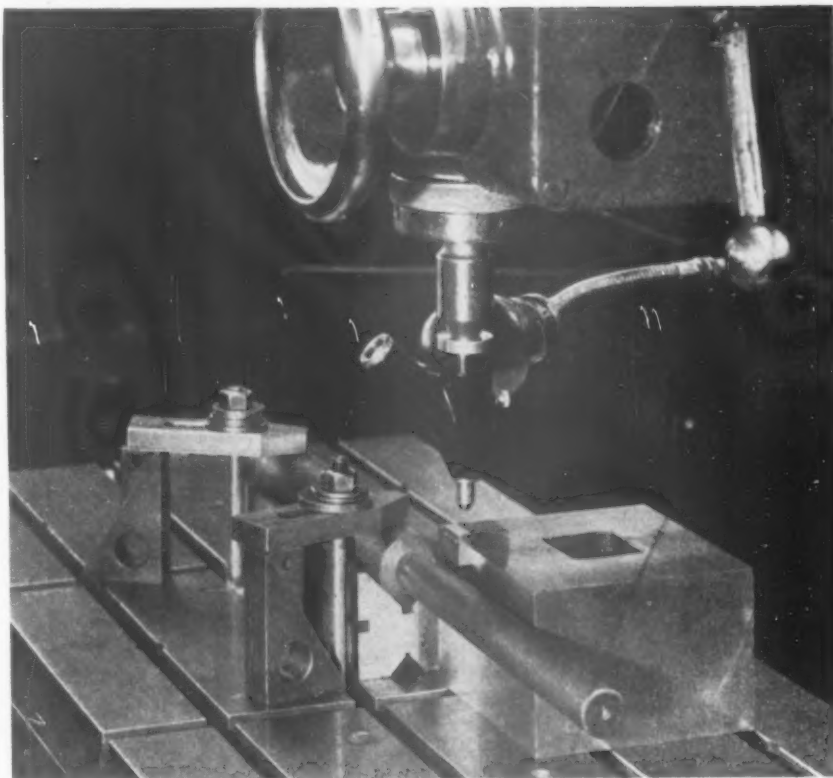


Figure 6—Edge Block on ground block set against bar which is held in V-blocks, furnishes reference line for Center Scope set in spindle. From there, table is moved half of bar diameter.

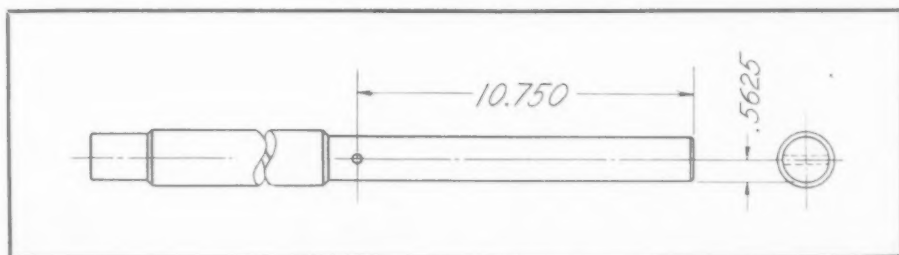


Figure 7—Working drawing of job to be done on the jig-borer.

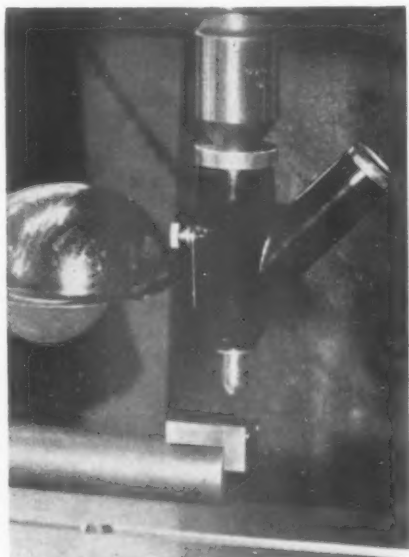


Figure 8, left—Shows placement of edge block for properly locating point for boring on long axis of the bar.



Figure 9, right—The machine spindle is located exactly over the work-piece for boring hole specified in Fig. 7. Locating time: 1.5 minutes. Allowed tolerances: .001-in. Actual tolerances: .0001-in.

Optics -- Applied to Jig-Boring



Figure 11—Angle plate is aligned approximately with table T-slots. After trimming Center Scope, for run-out, (see fig. 2.) the Edge Block is set on angle plate, to provide reference line for placing plate parallel to table travel.

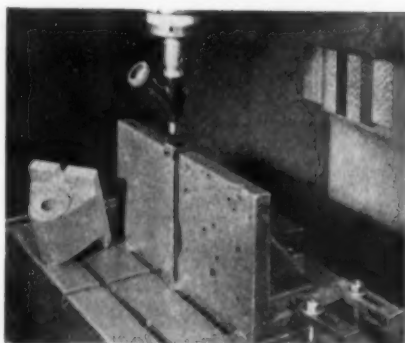


Figure 12—Placing Edge Block at other end of angle plate furnishes second reference line for accurately paralleling line of table travel.

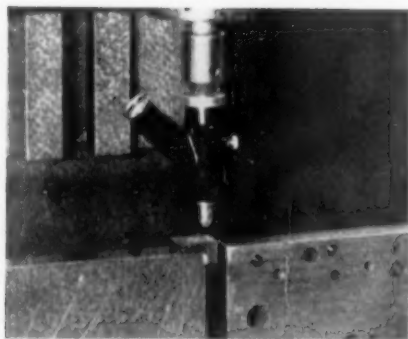


Figure 13—Edge Block is set on angle plate, perpendicular to line of table travel, and through Center Scope, the machine spindle is aligned with this edge of angle plate. Moving table cross-wise 2.875-in. and length-wise .3437-in. (see fig. 10), spindle is ready.

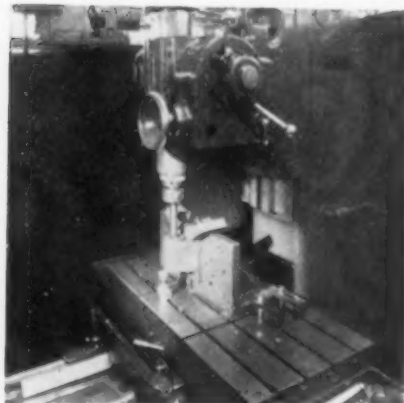


Figure 14—The boring tool replaces the Center Scope, and the set-up is completely ready for execution. Locating time: 2.5 minutes, to accuracy of .0001-in.

Boring a hole

For boring of a hole in a nut (Fig. 10), an angle plate, Fig. 11, is aligned approximately with the table T-slots. After trimming the Center Scope for runout, the Edge Block is set as shown in Fig. 11, and its reference line made to split the Center Scope guide lines. The plate is set accurately parallel to the table travel by moving the Edge Block to the other end of the angle plate, Fig. 12, and making its refer-

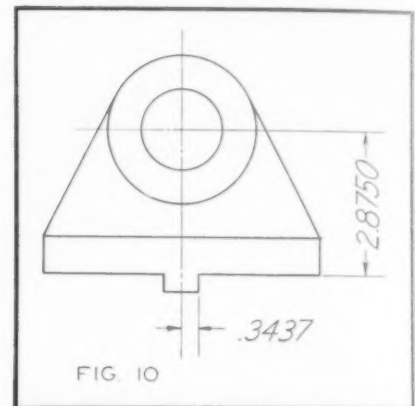


Figure 10—Working drawing for locating hole in a nut. Locating time: 2.5 minutes. Allowed tolerances: .005-in. Actual accuracy: .0001-in.

ence line again split the Center Scope guide lines.

It should be noted that in this operation of aligning the angle plate with the table travel, the machine spindle *at the same time* is accurately set in line with the face of the angle plate. The Edge Block is now set as shown, Fig. 13, and the machine spindle aligned with this edge of the angle plate.

If the table is now moved crosswise, a distance equal to 2.875-inch, Fig. 10, and lengthwise a distance equal to .3437-inch the machine spindle center is located accurately for the boring of the hole in the nut. The boring tool replaces the Center Scope and the set-up is complete, ready for execution as shown in Fig. 14.

The Crib — new feature in this issue of THE TOOL ENGINEER. See page 162.

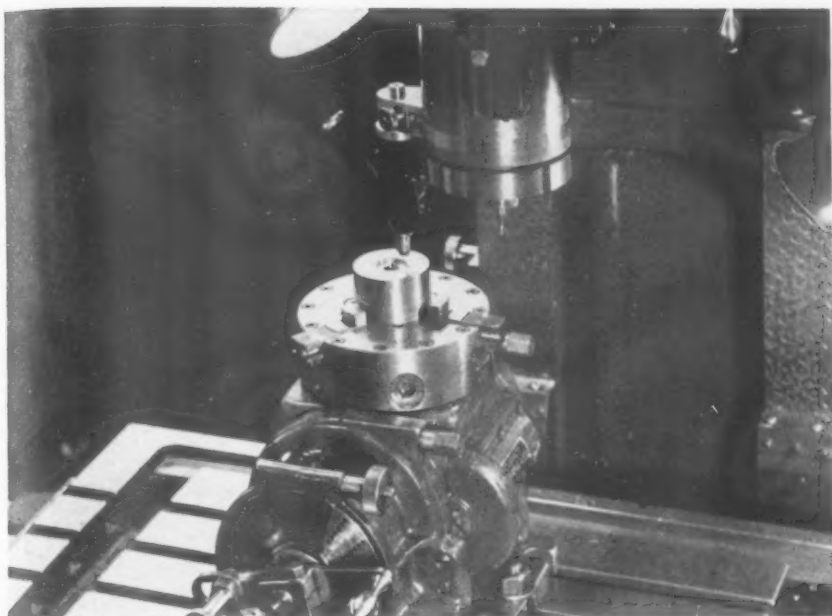


Figure 15—Center Scope, mounted in spindle of rotary head milling machine for checking on job.

Measuring die cavity

The use of the Center Scope for accurately measuring a cavity in a die is illustrated in Fig. 15. It will be noted that the Center Scope is mounted on the spindle of the rotary head milling machine so as not to interfere with the actual milling operation. Moreover after completing a cut, dial readings were noted, the cutter removed from the work piece and the dimension of the milled part checked with the Center Scope. If further milling is necessary, the original position can be easily and quickly re-established.

All dimensions on this die had to be held to very close limits of accuracy. Standard measuring instruments depending on mechanical contact with the work piece could not be used for measuring the .945-inch dimension (Fig. 16) across the flats, or the .493-inch core diameters due to insufficient clearances.

This job was milled on a rotary head milling machine. The dimensions specified above were milled to within a few thousandths of an inch by means of the micrometer dials on the machine.

The one flat was milled to within .004-inch according to the micrometer dial reading on the table screw. The dividing head was indexed and the second flat milled. The Center Scope was then mounted as shown (Fig. 15). The machine table was adjusted until

the edge of one flat was central with the guide lines of the Center Scope. The micrometer dial reading was noted and the table was moved until the edge of the second flat was central with the guide lines in the Scope. The dial reading was again noted to obtain the distance between the flats showing the amount of stock yet to be removed.

The Scope was then removed and the table set back to the original position plus the correct number of thousandths to obtain the proper size, namely, .945-inch.

Again the Scope was mounted to check the final size, thereby rejecting the source of error and not the finished piece.

The .093-inch core diameters were checked in the same manner.

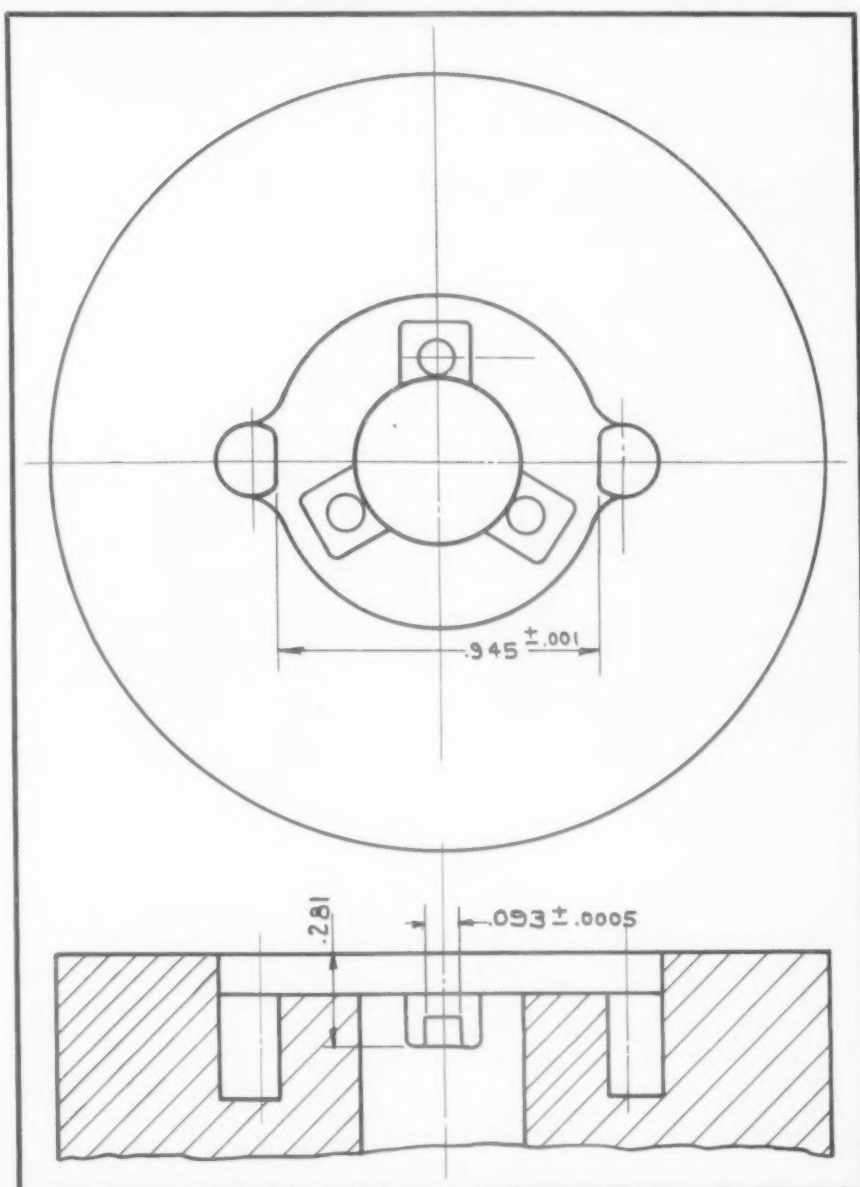


Figure 16—Drawing showing close working dimensions.

Horizontal boring

The illustration Fig. 17 indicates the manner of using the Center Scope to set the spindle of a horizontal boring bar accurately a specified distance above the boring machine table.

As shown, size blocks of the required dimension are used to support the edge block. The Center Scope guide lines are then split by the accurate edge block line. The spindle of the horizontal boring machine is now set exactly at the specified distance above the table and in line with the hole to be bored.

Boring on a lathe

A very interesting use of the Center Scope for locating to bore holes in a

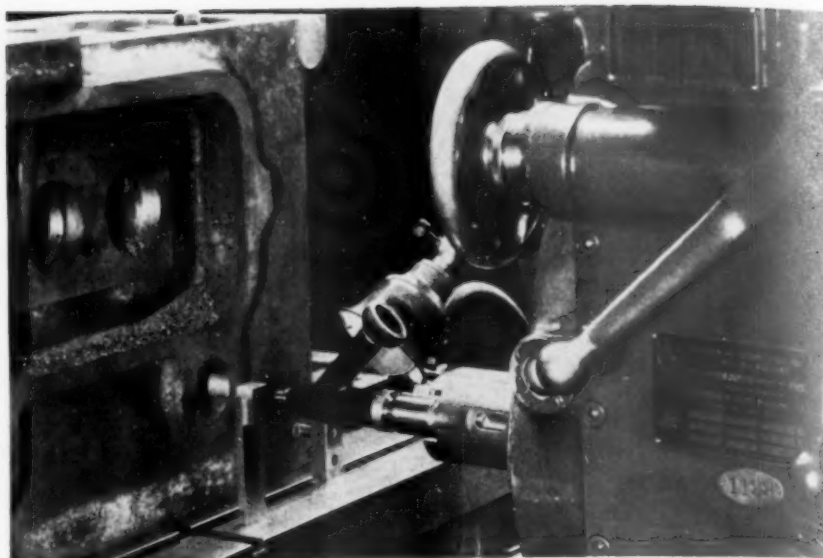


Figure 17—Setting spindle of horizontal boring bar a specified distance above boring machine table.

Optics Applied to Setting Spindle

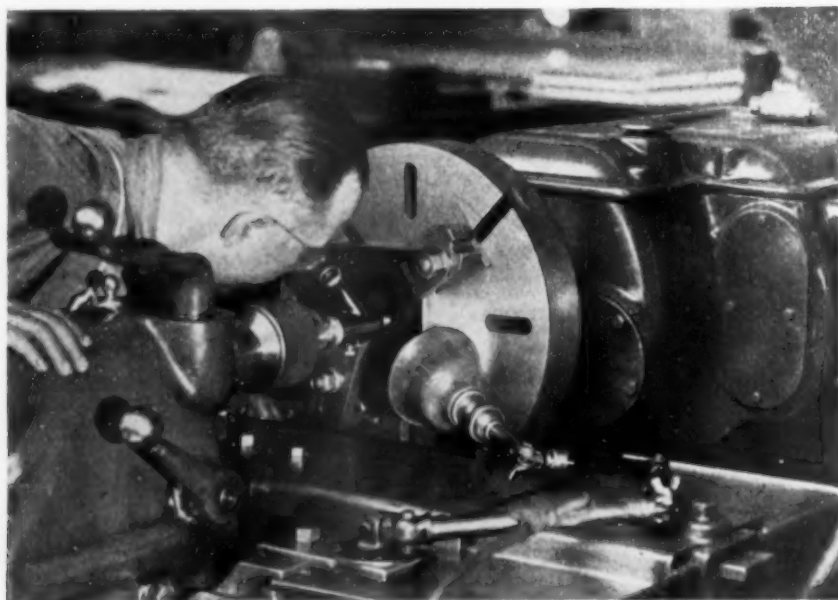


Figure 18—The Center Scope is used for locating to bore holes in a jig plate. Scribed lines are used in this instance, with surface plate and size blocks. (See fig. 20 for working drawing.)

jig plate on a lathe is shown in Figures 18 and 19. In the latter illustration, the layout of the jig plate is clearly visible. The center lines for the two holes shown in Fig. 20 have been scribed by use of a surface plate and size blocks.

The jig plate is then mounted as shown (Fig. 19) to the face plate of the lathe. The Center Scope is held as shown. After compensating for

runout, the scribed lines are made to split the Center Scope guide lines. The accuracy of this method is illustrated in the accompanying tabulation and is indicative of the accuracy that can be obtained with this optical locating instrument when used in conjunction with a lathe.

Figures 18 and 19 show the successive steps in locating the spindle for each hole.

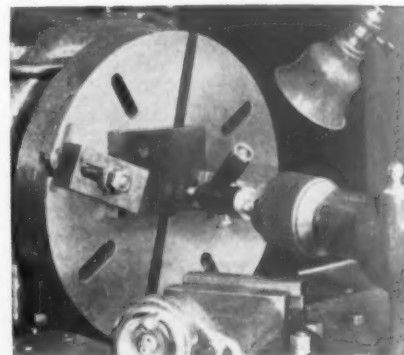


Figure 19—Jig plate is mounted to face plate of lathe. Scribed lines are made to split Center Scope guide lines.

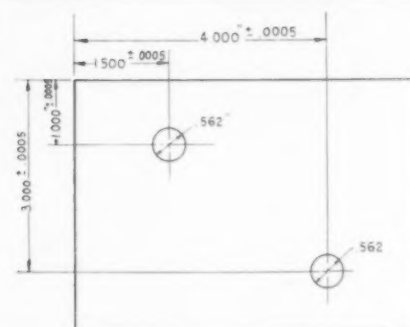


Figure 20—Method of laying out surface plate and size blocks on lathe. Locating time, each hole, 90 seconds. Accuracy obtained:

1.000-inch dimension.....	— .0002-in.
3.000-inch dimension.....	— .0002-in.
1.500-inch dimension.....	+ .0002-in.
4.000-inch dimension.....	+ .0002-in.

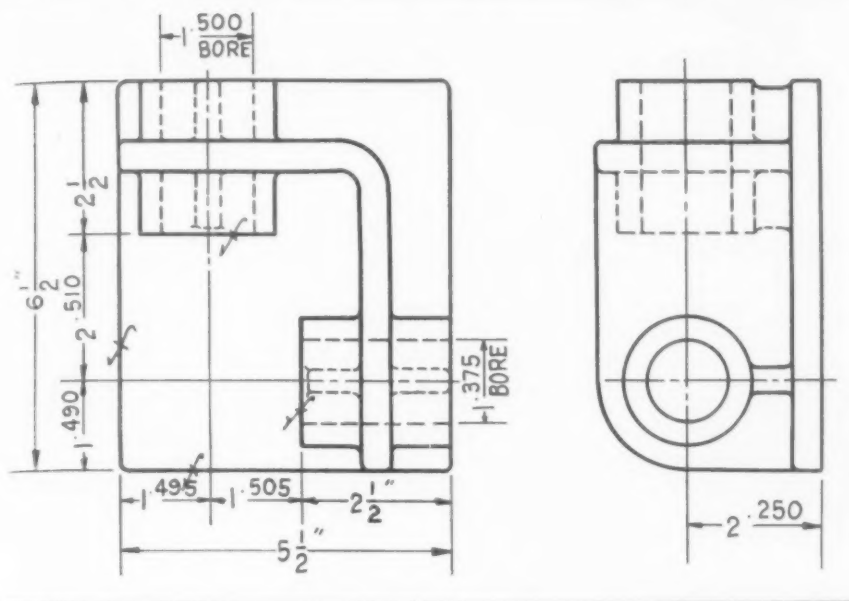


Figure 21—Working drawing of the nucleus of a master gage used in checking bevel gears. The boring of the holes in this gage was accomplished on a horizontal milling machine, equipped with rear controls. The Center Scope was used for accurately locating the milling machine spindle. Locating time, first hole: 120 seconds; second hole: 50 seconds; tolerance obtained to .0005-inch accuracy.

Locating Milling Machine Spindle

The part shown in Fig. 21 is the nucleus of a master gauge used for checking bevel gears.

The boring of the holes in this gauge was accomplished on a horizontal milling machine equipped with rear controls.

The Center Scope was used for accurately locating the milling machine spindle according to the layout in the following manner: the center of the machine spindle was set 2.250" above the surface of the machine table. A Center Scope with a rotary shank was mounted in the machine spindle by means of a 1/2" cutter adaptor. Size blocks totaling 2.250" in height were stacked on the machine table. The Center Scope edge block was then placed over the size blocks. By using the rear controls, the edge block was readily brought into focus and the height of the machine knee adjusted until the line on the edge block was brought between the guide lines in the Center Scope.

When using the rotating shank model of Center Scope the Spindle is run at a slow speed (from 40 to 80 R.P.M.) so that any slight adaptor runout will be apparent and will be

taken into consideration in making final adjustments.

The accompanying sketch (Fig. 21) specifies that the center of the 1.375" diameter hole should be 1.490" from the adjacent parallel edge. A parallel was held against this edge to support a stack of size blocks totaling 1.490". The edge block was placed against the size blocks and the table adjusted until the edge block line was between the Center Scope guide lines.

To locate the second (a 1.500" diameter) hole, it was only necessary to turn the work piece 90° and use size blocks totaling 1.495".

This method of locating completely eliminates any error that may creep into the layout due to wear and inaccuracy in the milling machine screws.

"Industry's Problems in Defense Inspection" are discussed in a talk by F. E. Ellison on page 83 this month's TOOL ENGINEER.

Boring hole in casting

To locate the spindle of a horizontal boring bar accurately and quickly according to specifications, the Center Scope can be used as shown in Figures 22 and 23, where the job calls for the boring of a hole in a casting accurately to close limits from its machined top and edge.

The edge block is set as shown in Fig. 3 and the Center Scope held in



Figure 22—Center Scope and Edge Block are in position for locating the spindle of horizontal boring bar, preparatory to boring hole in a casting.



Figure 23—After locating spindle to top edge of casting, Edge Block is placed for locating from side edge. Necessary movements, vertical and cross-wise, bring spindle in line with center hole to be bored. No layout or measurements necessary on work-piece.

the horizontal boring bar spindle. The center line of the spindle can then be quickly and easily brought into line with the top edge of the casting; likewise with the edge of the casting. The necessary movements, both vertical and crosswise, can then be made to bring the spindle in line with the center of the hole to be bored. Again no layout or measurements were necessary in this economical locating method.

"Extra Power on the Firing Line"

Knudsen says tools are power that will win

"Ahead of you is the number one problem facing American industry today . . . Every new machine tool you can save, every machine you can convert will mean extra power on the firing line. This is the power that will win." *William S. Knudsen, Lt. General.*



"On our shoulders rests the fate of civilization . . .

"Unquestionably, Tool Engineers are the most important engineering body in the world. On our shoulders rests the fate of civilization. It seems to me that everything that we can do as Tool Engineers should be done. We have done a great deal, but we have only begun." *Otto W. Winter, president, A.S.T.E.*



"Work without regard for hours to insure victory.

"With the tremendous increase in machine tool hours and machine tools engaged in fabricating parts for war machinery, the number of experts on the production line is all too small. Those who are qualified must work without regard for hours . . . to insure Victory." *Rear Admiral John Downes.*



TECHNICAL SESSIONS

The second of two portfolios of talks given at the 10th Annual Convention of the A.S.T.E. is contained in the following ten pages. Talks are listed below.

Conversion to War-time Production

"Defense Contract Distribution," by Clifford Ives, War Production Board, Milwaukee.

"Management's Problems," by Hugh H. C. Weed, Vice-Pres., Carter Carburetor Corporation, St. Louis.

Materials Substitutions and Shortages

"General Engineering, Manufacturing and Metallurgical Problems," by Dr. D. R. Kellogg, Westinghouse Elec. & Mfg. Co.

The Problems of Defense Inspection

"Industry's Problems," by F. E. Allison, Chief Inspector, Wagner Electric Corporation.

"Problems of Government in Inspection," by Captain A. R. Burgess, of the Army Ordnance Division, is scheduled for early publication, pending War Department approval.

Tool Engineering . . . A Key to Victory

"We cannot repeat the old Dunkirk history of too little and too late . . . Better to pay a little bit more for the use of existing engine lathes and preserve Democracy."



Conversion to War-time Production

Defense Contract Distribution

**Clifford Ives, War Production Board
Milwaukee**

IN one of his speeches Donald Nelson said:

"We have to realize the value of time . . . a machine gun factory in full swing can equip a whole regiment in a day and a half, thirty-six hours of work. That is why time is important. Every minute counts. Yet, some manufacturers have come to the War Production Board to plead for just a few extra months before getting into production. Some of them want to delay over details. Some of them argue before awarding a subcontract. I know of a case where twenty-six days were wasted, just this way.

"You and I will not stand for that!

"Then, too, I know of cases where workers in war plants have been told by other workers, by men in their unions, to keep production down, to take it easy, not to hurry, to spread the job and make the work last.

"You and I will not stand for that!

"Those cases are not typical. They are becoming fewer and fewer. In my opinion, they simply reflect the fact that a few people just haven't got it through their heads that this is a life and death matter."

Tool Engineer the keystone

The Tool Engineer is the keystone in this production program. He works and makes designs for tools, which increases the output per man. He increases the number of tools to employ the greatest number of men and women.

At the beginning of 1942 we were producing machine tools at a rate of \$1,000,000,000 worth per annum. The goal is to double this in 1942.

But, while these tools are being built the existing tools,

though less productive, are being drafted into service against the time when they will be augmented by the higher speed and more modern kind.

Changing economy

But before getting down to shop talk, let's say something about the great change from peace time economy to war-time economy. Changing the manufacturing of automobiles to the manufacture of cannons, changing the making of tires to tank treads, gadgets to guns, changing from one job to another, from assemblers to machinists, salesmen to shipbuilders, these are tasks sometimes easy, most times hard and painful!

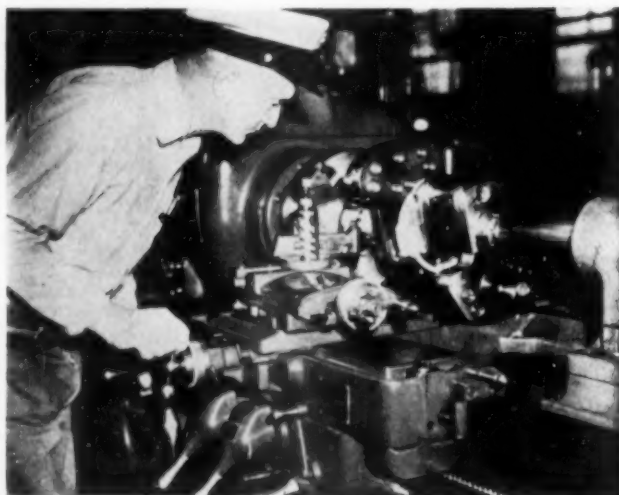
Something over two years ago the Office of Production Management was started. At that time eighty percent, or better, of defense contracts were in the hands of fifty or sixty large prime contractors. Material scarcity was not being seriously felt and small manufacturers found little difficulty in finding materials for their normal peacetime production. But, forward-looking men saw that it was going to be necessary to enlist the services of the smallest production plants to bring defense production up to a faster tempo by splitting up prime contracts into smaller subcontracts.

The Defense Contract Service, as it was known a year ago, essayed to do this job and so demonstrated its worth that it became a major division of the O.P.M. It became known in September of last year as the Division of Contract Distribution.

As the tempo of defense production increased, it became necessary to establish the priority system to reserve materials for defense production. Materials for peacetime

production naturally became more scarce. During the fall and winter of 1941, the Division of Contract Distribution expanded until over 115 offices were established at strategic points throughout the United States, staffed with several thousand engineers and industrial specialists whose job it was to enlist factories of all sizes into the scheme. This trend was accelerated after Pearl Harbor. The task of this division, as well as the other six divisions of the O.P.M., became of such importance that it was necessary for it to go through a further streamlining and the O.P.M., itself, became known as the War Production Board under the able leadership of Donald Nelson.

Several of the divisions were combined and the Contract Distribution Division became the Contract Distribution Branch of the Production Division still with subcontracting as its keynote. But, the Contract Distribution group found other important jobs to do in the economical conversion.



"Put the engine lathes to work!"

"Multiple automatics work faster than engine lathes, if you have them, but... the engine lathe, with a good American behind it, can produce certain parts with cost comparable to the best turret lathes... A threading job on a turret lathe uses an expanding die head only fifteen or twenty percent of the time, while on the engine lathe it can be used up to eight percent of the time. Expanding die heads are highly critical."

Official U. S. Navy photograph.

Throughout the summer, fall and winter of 1941, while the priority staff enabled the essential industries to get their materials, the less essential industries finally began to convert to wartime production. But military procurement could not be built up fast enough to absorb the combined capacities of these manufacturers, and there were many bidders for each and every available government job.

Manufacturers of every description were forced to seek some means of getting military business. Some found the going easy; others found it difficult. Many still find difficulty in converting to the military needs.

The relative scarcity of government contracts compared with the combined productive capacity brought about a rush of representatives of larger industry to Washington. It crowded the capital with business representatives of all kinds. The path of least resistance was to give the jobs to the big fellows. The smaller firms had not the capital nor the personnel to send representatives to Washington. This brought about the expansion of the Contract Distribution offices, in order to bring Washington to the doorsteps of the small manufacturers, so that they need not travel long distances to bid on contracts. It brought about the wide advertisement of all contracts, of all sizes.

Along in the late summer, last year, the washing machine industry was certified as being distressed, and prime contracts were given to the industry as a whole. But, relief could not be had by all industries as fast as curtailment took place. Many throughout the country became distressed before the tempo of procurement could overtake that condition.

After Pearl Harbor

Shortly after "Pearl Harbor," new rules were adopted and the services began to place contracts in larger numbers and greater volume. Personnel of the contract distribution was increased. Automobile production was entirely discontinued February 1st. This brought extreme distress in areas where automobile production and tire manufacturing were the major sources of income. Naturally, efforts were immediately made to relieve this labor displacement.

There are many outstanding examples where automobile plants have been swept clean of their special machinery and replaced with an entirely different setup, adapting them to the manufacture of guns, shells, planes or tanks.

In some localities wartime procurement has far sur-

passed peacetime production. In others, it has not quite yet come up. But on the whole, the country is beginning to feel a labor shortage and from now on a very real labor shortage will develop as wartime procurement increases in tempo and as draftees are called into service. Trainees in vocational schools are being absorbed as fast as they can be trained. Women are also taking up training, and there will be an increasing amount of them used in war production.

Demand greater for some tools

Though the machine tool capacity must be more than doubled this year because this war is a race of maximum production and not one moment can be lost, the demand is greater for some tools than for others. Where there is a critical need for screw machines, milling machines, and grinders, there is a relatively little demand for sheet metal working machinery such as shears, brakes and power braces. Thus it has been necessary for these manufacturers producing less needed equipment to retool their plants entirely, into the making of shells, bombs or other things. Their workers must retrain for the operation of different machine tools.

We need more steel castings and steel forgings for guns, tanks, and mounts. Therefore, electric and heat-treating furnaces, die hangers and steel hammers are much in demand. There is a big demand for horizontal boring mills, the production of which must be stepped up at least three times this year.

Subcontracting has been the keynote of the Contract Distribution Branch ever since its inception, and subcontracting is even now more essential than ever before.

Relieve pressure on the critical machine tools needed on bottleneck jobs. Manufacturers of bomb parts now see the absolute necessity of accepting the use of engine lathes in lieu of turret lathes because the screw machine and turret lathe capacity is completely absorbed.

It costs a little more, of course, but we cannot repeat the old Dunkirk history of too little and too late! It is a lot better to pay a little bit more for the use of existing engine lathes and preserve Democracy. Ordnance is saying: "Let's put the engine lathes to work!"

Multiple automatics work faster than engine lathes, if you have them, but strange as it may seem, the engine lathe, with a good American behind it, can produce certain parts with cost comparable to the best turret lathes.

For example, a threading job on a turret lathe uses an expanding die head only fifteen or twenty percent of the time, while on the engine lathe it can be used up to eighty percent of the time. These expanding die heads are highly critical, too.

Forty billion plane parts are yet to be made. If all the guns in all those planes to be assembled were fired at one time, for one minute, they could spit out six hundred million projectiles. It is going to take a lot longer than one minute to make all those projectiles, to say nothing of casings and powder.

What of the one hundred thousand tanks that must be made within the next two years? And the ships? And the artillery? And the small arms? The bomb sites? Gyro-pilots?

The manufacturer who hesitates to convert his factory to wartime production, misses an opportunity which has

never existed in history. It exists now. But, in three ways we can lose the war. One—we can lose by continuing to fight the defensive struggle. A war of movement is a war of offense, of the initiative, of advanced planning and risks.

Two—we can lose by assuming that victory is inevitable for American arms! Nothing is inevitable in human relationship, much less in war. Wars are won by sweat and toil, tears and blood. Let's have done with any talk of the inevitable American victory if we are to win this fight for freedom, decency, and justice in the world!

Three—we can lose by assuming that vast Congressional appropriations are enough. This is not a war of gold treasure, but of productive labor—work, creative work, sustained work, purposeful work; work applied to the task of the production.

The allied countries have seventy-seven percent of the world's population. In 1935 an authoritative study showed that the United States and Great Britain together had fifty-four percent of the world's industrial capacity and sixty percent of the heavy goods capacity. Germany then had only eleven percent of both, and only one-fourth as much as this country. In the years since, however, Germany has worked feverishly to increase her capacity and since the war began she has added the industrial capacity of all Europe. Now, her actual capacity is unknown. What we all do know, now, is that her capacity is being stepped up and that American factories must produce all we can as soon as we can.

In spite of the Axis gains, the United States and Great Britain still have over fifty percent of the world's industrial capacity. By the end of this year, the United States, Great Britain, and Russia together will have over two-thirds of the world's steel capacity.

Soldier without a gun

Capacity, however, is not enough. Our potential strength, our natural resources won't mean a thing to the soldier without a gun when the enemy charges, unless these potentialities and latent resources have been translated into weapons with which our soldier may defend himself. They must be translated in time. Tool Engineers are just the fellows that can do it!

The allied nations, together, produce about eighty-one percent of the world's copper. Most of our tin supply in the Pacific has been cut off. However, we have enough for approximately ten years if we use it carefully, and if the available production is kept up.

Aluminum is a little bit better than fifty-fifty, with our capacity increasing. On food and clothing, our position is good! What we lack are the man-years of production behind us. The Axis started producing years before we did. It will take time to match their war materials already produced.

Tool Engineers are the keystone of American productivity. From their drawing boards come the designs for tools of the nation. Let us be more ingenious and build tools so that one man can do the work that three thousand do, so that a man hour of production can be multiplied by three; then, three times three.

This is not asking the impossible. For example, in one case, the time for rifling a gun barrel has been reduced to one-seventh of its former time. And, most of us are familiar with the recent step-up in the speed and manufacture of shells through our Tool Engineering ingenuity.



**Solutions to problems of engineering
manufacturing and personnel today.**

Conversion to War-time Production

Management's Problems

**Hugh H. C. Weed, Vice President
Carter Carburetor Corporation**

THIS war has two main bottlenecks. One is ships and the other is tools—machine tools, small tools and gages.

We have manufacturing organizations, talent, experience and men. But we haven't the tools. There has been a great acceleration in tool manufacture, but there has been a much greater increase in the demand.

In Washington last week, we were asked to start building parts for airplane carburetors. Airplane carburetors are just as far removed from our normal manufacture as ten-inch guns, but when I saw the problem, the expanded number of airplanes required, I did not see how we could refuse to do anything to forward that program, no matter what it costs us in time, effort, and money. We must attack bottlenecks.

For tool men who own tool making plants and sell tools to others, here is a suggestion. When you are oversold the obligation is greatest not to profiteer. A while back, one plant wanted 120 units. They sent out to see what they could get them for. Bids started at \$500.00 a unit and ended at \$2,200.00 a unit. They built them in their

own tool room for \$200.00 a unit.

Of course, the fellow outside has direct tool cost, overhead and profit, and this plant did not include all this overhead and profit. But somebody was wrong somewhere between \$500.00 and \$2,200.00.

Suppose some fellow who had a tool contract, at a fixed figure, went back to the man who gave him the order and said, "Mr. So-and-so, I did this thing a lot cheaper than I expected to, and I am going to reduce your price." It would be the best piece of salesmanship he ever did in his life.

To men whose business it is to produce better tool designs, better working facilities in your plants, to men who ask "How can I get machinery?" here is a suggestion. Take the machinery you have and make it produce 150% of what it is supposed to be producing. Then take your record to Washington and you will get all the machinery you need.

A plant producing fuses for the United States Government, has had a monthly schedule of 81,000 units. Now they are producing something over 160,000 units, with no

more machinery. Tool Engineers are the fellows who did that job. That is the thing they can do better than anything else to win this war—taking the facilities they have and making them hum.

Co-ordinating effort

That is one part of it. Any other part concerns the fellows whose business it is to coordinate effort. There are a lot of elements to that. One of them is to know your business. Another one is to get around among your people and find out what they are thinking about. Another one is to make sure that departments get in harness together, and when a little carborundum gets into the gears, to get them together and straighten it out.

The paying of high wages gets low costs, provided that with the incentive that goes with the high wages, or high incentive plan, goes a carefully thought out organization so that the efforts of people are not tumbling over each other but are well coordinated and move in unison.

Our situation, in relation to war work, was particularly fortunate. Here is something of what happened late in 1939. One of our customers, being commissioned to get fuses, asked us "How would you like to make fuses?"

We took a look and the boys in the shop devised a new method. They took a battery of Kingsbury machines, of a type unique in this country, with fourteen stations per machine, and figured out how they could chuck two fuses, a little bigger than my thumb, in each station. So we are making twenty-eight fuses per machine at a time. That is what tool designers can do. That is the kind of work that will win the war!

Overtime

There is a lot of talk in the papers about the forty-hour week, and about time and a half, and double time. There are good reasons for time and a half. Whether it should start at forty hours or forty-eight is a matter of debate. But there is no doubt the good reasons for it.

One reason is this. Every foreman is busy as a bird dog. He has twice as much as he can do. It is almost more than you can expect to have him wondering all the time whether he is making a man work more overtime than he ought without pay. But, if the management says, "Mr. Foreman, you account to me for every hour of overtime, and justify it—it is all right but you justify it—" that focusses attention on the proper use of overtime and is in the interest of the man who is working. For the foreman is then compelled to think whether or not he really needs his overtime.

"Take the machinery you have . . . make it produce 150% . . . take your record to Washington . . . and you'll get all the machinery you need."

Hugh H. C. Weed



The other reason is that business cycles go up and down. Many of you remember when tool work was hard to get. If you use a time and a half setup—when there is a shortage of men—and you give your men all the time and a half they can take and still be efficient you have an automatic means of meeting that situation. You go up and down with the tide.

Giving subcontracts

Let's consider subcontracts. It seems to me there are several essential points. One is to make sure that the fellow who contracts is going to make good. It is all right to vaporize about giving subcontracts but unless you know it is going to be well done and on time you had better not let him have it. If you have twenty-five hundred men working each day at a high pitch, and one little item isn't there because some fellow made it bad, or was late with it, your whole system is out of gear. The War Production Board should look that one over carefully because that is the essence of the matter.

Another point is not to have a price differential so great that the net bid on the whole unit is out of line. Funny things arise from subcontracts. We all like to think our costs are just about right. But every once in a while we get a terrific kick in the teeth because we send out some bids and a figure comes back that is lower than our materials cost. We check up on the fellow and we find to our chagrin that he has got us licked in that particular item. We are properly ashamed of ourselves, and it spurs us to do likewise.

On the other hand, lowest bids are sometimes five times our cost. It is a good thing to get a lot of bids because from the most unexpected sources are coming some of the

Donald Nelson says: "We have to realize the value of time . . . a machine gun factory in full swing can equip a whole regiment in a day and a half, thirty-six hours of work. That is why time is important. Every minute counts."

brainiest results in this war.

Our factory manager found a young fellow who has a little bit of a machine shop, but a good one. He has him loaded to the muzzle and he is doing a wonderful job. One of our tool designers has a father who is pretty well along in years, but he is a good mechanic. We give him all the gages he can make and he makes good ones, and he may be down there at midnight making them and he may knock off at two o'clock in the afternoon. We don't care, just so he gets out the gages.

If you can reach out and find those fellows who can do good stuff, right now, they can be one of the big elements in winning this war.

Concerning the transfer from peacetime work to war-time work, if you were in this early enough to have an organization going so that all you have to do is expand it, your problem is quite easy. But, if for any reason you are still working mostly on peacetime work, you have a real problem ahead of you.

There is a shortage of good labor and if some morning the W.P.B. says "nix" on your product, and you have to lay your men off for two or three or four months to get tooled up, you are not going to have them. Too many people want them now.

My suggestion to the fellow in that shape is to get a subcontract. It takes time to get your first contract, but if you can make a reputation for dependability, uniformity and delivery as scheduled, your next ones are just a matter of routine.

If you want a subcontract

If you want a subcontract, go to the fellow letting the subcontract, walk in some morning and say, "I have such-and-such a machine and I believe I can do a job for you. Let me look over what you are doing." He probably will say yes, because he is looking for fellows to do his stuff. If not, he will tell you about some one else.

I think what industry needs more than anything else from the War Production Board and the rest of the boys in Washington is to be let alone. Don't ask us to take men drawing up designs for tools which are going to make bomb fuses and ask those busy men to make reports about how many tools they have idle, if any. Don't ask us to do things that are not productive. Let's make production item number 1.

Product design today

About personnel, one of the major problems relates to product design engineering. Engineers in this field are not called for immediately in most cases because the government just sends blueprints and says, "make this." Government has little time right now to try anything new. That doesn't mean they won't accept any change but it takes a long time. You take what you get and make it. If you cannot make it you try to get an exception. But generally they tell you what to make so that your product design engineering is not in so much demand, though your plant layout and tool design are in demand every minute.

The problem after you get a contract that will run your plant and carry your overhead, is to try to get a product your design engineering group can work on. After all, this war isn't going to be over this year, or next year. That is the second phase of war production.

This personnel business all resolves itself down to one main item—to get fellows to want to give all they can to their country. I don't think for a minute that there is a man in a thousand who doesn't want to do that, but lots of times he doesn't know how, and it is the business of management to find out how and to sell him on the idea of how it should be done.

*Bits & Pieces—page 94—presents
highlights of discussion following
the St. Louis talks, in this issue.*

After Pearl Harbor I went over the next evening to get my car at the service garage, and the old watchman who was over there said, "I wonder if I couldn't get a job a little more important than this job I have got. My wife who is too heavy to work gave a couple of pints of blood, my daughter works in a defense industry, and I am down here watching. Isn't there something I can do to be more useful?"

I said, "I don't think we have anything more useful than watching a plant of this kind. If someone sneaks into this plant some night and sets off a bomb and blows it up, the work of months is gone. You are here to prevent that. Keep your eyes open."

It seems to me that the essence of a personnel job is this: There can only be two things wrong between a man and his job. Either the job itself isn't right or the man's mind isn't right. Your personnel group ought to sense the spots where there is dissatisfaction and they ought to find out, if they can, whether the complaint in the man's mind is real. When complaints come in the personnel man ought to go over to the fellow running that department and say, "Listen, Bill Smith was telling me the other day this job is all sour. He can't make it go. I think it is right. Take a look at it mechanically. There is no use having him in that frame of mind."

Or, if, after looking it over the personnel man feels this fellow is just off on the wrong foot, the thing to do is to sit down and have a talk with him, and show him where he is wrong. That takes a good man.

We have a fellow who does it very well in our plant. He hasn't been at it very long, but he is doing a wonderful job at it.

That is just one element in getting men to produce the most they have in them. First, they have to be happy. Second, they have to feel that job is right. Third, they have to feel the management is fair. Everybody knows you cannot fix everything at once, but they have to realize that back in the back of the management's head is the ideal of having that plant the best place possible to work, and if they know that, they'll be patient until you have time to get around to the job.

And, so I think that the key to victory now is to sell the team on the bigness of the job they have to do, so that they put their whole heart into it. Only in that way can we defeat these organized bandits who have a six years' start on us. Only then can we look ourselves in the face when this is over.

If we do that, the response will be magnificent. It has been magnificent where it has been done. Teamwork, in that sense, is the key to victory.

Materials Substitutions and Shortages

General engineering, manufacturing and metallurgical problems.



"The Lord was good to us when he laid out this country, but he left out a few things."

Dr. D. R. Kellogg, Westinghouse Manufacturing & Electric Company

WHEN it comes to studying and working with shortages and substitutions, two things are necessary. One is a crystal ball, and the other is a great manual skill in crossing the fingers. The crystal ball is to enable you to guess what to do next, and the cross of the fingers is to hope that you'll get out of a wrong guess.

There are a number of ways to consider material scarcities. One way is to list them according to their uses and relative availability. Here is such a list of materials that more or less affects Tool Engineers. It is part of a much longer classification recently published in a magazine.

GROUP I — Materials most vitally needed for war purposes; not generally available for civilian needs:

Alloy Steel — Iron alloys, alloy steel, wrought iron; aluminum; aluminum scrap; cadmium; calcium-silicon; chromium; cobalt; copper; copper scrap; iridium; lead; magnesium; nickel; tin; tinplate and terneplate; tungsten; and vanadium.

GROUP II — Basic materials that are essential to the war industries but whose supply is not as critically limited as materials of group 1:

Antimony; barium-carbonate; beryllium-copper alloys; carbon tetrachloride; casein; diamond (industrial); diamond dies; linseed oil; manganese; mercury; mica splittings; molybdenum; phosphorus; platinum; potassium perchlorate; potassium permanganate; quartz crystals; rape seed oil; rhodium; rubber (reclaimed); shellacs; sisal; steel, carbon scrap; tetra ethyl lead; titanium pigment; and zinc (all grades).

And — here comes the payoff — in another group are listed war materials presently available for substitutions in critical civilian industry: basic low-carbon steel; gray cast iron; and malleable iron.

Such a list is all right, but there is more to the story. Some of the materials are hard to get because there is a very large demand for them. Some of them are hard to get because there is a large demand, and they don't grow here. The Lord was pretty good to us when he laid out this country, but he left out a few things—rubber, tin, antimony—which have caused us a little difficulty.

Aluminum

You, perhaps, know that for many years all of the radio cabinets used by the Navy, whether on ship or shore, had

nice aluminum panels and aluminum angles. They were a nice looking outfit and they were fine. But Washington asked "Why use aluminum, of which we can make planes, for panel boards on things where lightness is not so important?"

Not long after that we got word we could make those things out of steel. Why should anybody make a panel board out of aluminum just because it looks swell? That steel will be painted, and in time that paint is going to rub off. What of it, in the light of these times?

We had a design for die cast aluminum rotors, that is, the conductor bars were aluminum. We are going back to copper rotors. They are just as good, but cost more, and are harder to make. Our plans to swing over to aluminum die cast rotors on the quantity lines are on ice.

At Cleveland, where we manufacture fixtures for street lights and other commercial lighting, they used to make reflectors of high-grade special aluminum, sheet aluminum, giving it the Alzak treatment, the Aluminum company's special brightening treatment. We got a swell dish out of it. We have gone back to what we did years ago, using a frame holding a glass reflector and plating the back of the glass. It is expensive and more fragile. It gives just as good reflectivity unless the varnish on the back of the glass goes bad. It isn't a nice thing to make but it works. It is an honest thing. When it fails it is going to fail all at once. The customer doesn't know the difference, providing somebody doesn't hit it with a stone.

Watt-hour meter sockets were made with a die cast aluminum base. They were fine, both from a manufacturing and performance standpoint. You could stick them out in the rain, snow, hail, and sulphur smoke. They would darken but still they wouldn't corrode badly. Production was about five thousand a day and each weighed about a pound.

Plant engineers went to drawn steel, zinc plated. That called for quite a lot of zinc, but because they had saved 5,000 lbs. of aluminum per day they were able to get enough zinc for plating. With a special bonderizing and paint, they will stand up quite a while. Eventually the paint and enamel and zinc and bonderizing are going to wear through and they are going to rust, but they can be repainted.

Tin

We have three principal uses for tin—babbitts and their equivalent, solders and bronzes.

For years there has been a belief that for many applications the only good babbitt was a high-tin babbitt—ours went to 88% or more. Some engineers today will swear that if you used a lead base babbitt on a given application the world would blow up. We have changed over our bearings on many of our industrial motors from high tin to lead. We haven't heard of any world blowing up. We are changing those bearings to the lead base, which has very little tin, or none, just as fast as we can. We don't dare do it on a good many things, such as the Kingsbury bearings for important application. We don't dare do it on some of the Navy propulsion stuff, because it is much better not to have tin for anything else than to lose the operation of a Navy Craft. But we are doing it on a lot of things.

We have experimented with a bearing—which has 12 or 13% antimony to about 3% arsenic, just a whisper of tin, and the rest lead. Our experiments on it so far are very satisfactory. We don't know how it will behave under all conditions. But we have some pretty good results on life, and on effect of temperature. While antimony isn't one of the easiest things in the world to get, we are not so short on it now.

We also have a wiping solder which has been made of 34% tin. The men responsible for it started seeing how many places they could use it. But, some of our fellows were down in Washington and they got backdoor gossip to the effect that a ruling was coming out setting the limit at 20% tin in solders. Everybody shuddered.

So we continued working with the lower tins, and got down and tried some 15%. It wasn't so hot.

At the same time, Federated Metals had produced a solder with only 20% tin, $3\frac{1}{2}\%$ bismuth and $1\frac{1}{2}\%$ silver, and 5% antimony. It is good. The men at the Newark plant, where we make meters, got some in the core variety and passed it out to the girls and said nothing. The girls went ahead and used it. Apparently it doesn't become brittle, and is quite as satisfactory as the 42% alloy. It does have a slightly higher working temperature, but not high enough so that the girls notice it.

There are a number of solders with which we ought to be a little careful. Our Canadian Company has tried solders with high antimonies. They are brittle and they don't wet any too well. Some went as high as 18%, the rest lead, some tin.

There is another which has merit but we don't know enough about it yet. It contains cadmium with about 5% of silver. On some applications where you want high temperature, scarce cadmium might be obtainable, with an A-1 rating and half a dozen diamonds and rubies hung on it. It is a 380° C. solder and wets copper beautifully, though in thick sections it is liable to be just a little brittle.

We have just about given up tin as a protective coating. We still use it now and then to a small degree where we need to lubricate a surface which is to rub over one another. For instance, a cadmium plated piece rubbed on another will "gall," but if you put just a whisper of tin on there it lubricates the cadmium, eliminates that galling and still holds the calibration on the equipment.

Steel

We once used stainless steel not only because it was stainless, but because it had swell physical properties. We could make gorgeous springs out of it, let it carry current and relatively high temperature without undue oxidation.

We have had to make all sorts of changes. In one case, we used a little piece of stainless steel—about five-eighths long—in thermostats, because it would continue to carry current at the operating temperature of the thermostat and wouldn't oxidize. After we changed that to silver. Curiously enough, it didn't hurt the cost very much and it works just as well.

Most companies take great pride in having name plates look and stay nice, even out in weather. We used to make big ones of stainless steel, with designs etched in them. There was enough education on most of those to make a pretty good book. Now, what to use? One outfit is using plain decalcomania; one is using etched zinc; another is using steel with a baked enamel coating, etched and lettered and filled in. Those things aren't so very good, but who cares—provided, the style number of the piece of apparatus doesn't get lost. To avoid that, in some cases, we are figuring on actually taking a set of steel punches and stamping the number into the piece itself.

On applications using nickel chromium steels we went to the chromium steels. We thought we were pretty well set. Then it became evident that there was not going to be enough chromium to go around, so we had to take other steels.

We have a non-magnetic steel that we use for the cases of induction regulators. It has something like 7% nickel and somewhere around 10% or 11% manganese, and it was all right. Nickel being scarce, our boys went to work with the steel people and cooked up a non-magnetic steel which had something like 5% less nickel in it but more manganese. Then, manganese became so short we had to lay off that. It was easier to get nickel than to get manganese. Tomorrow we may find that nickel is more scarce than manganese, relatively and may go over and continue our work with that. That is the type of thing we run into regularly.

We used to have at East Springfield a streamlined fan. It was a good job, and a nice thing to make. The stands were all zinc die castings. The cast iron base now used doesn't look so good, but you can buff it up and put on a crinkle finish.

Brass

On ordinary lamps the base shells have always been drawn brass. Now they largely are made of ordinary deep drawn steel with brass plating on it. Brass is hard to get, but the amount of brass on a lamp base isn't much. We fear we are going to have some of them rust in the sockets when they are put in outdoor exposures.

We would stand up and scream if anybody proposed that under normal conditions. But the number that will cause trouble is small.

Nickel

Inside the lamp we used to have nickel wires. We are replacing those with nickel-plated iron in some cases. In some cases where the lamp goes on a job where there is not much vibration, we use pieces of copper in there. Copper isn't easy to get, but it is easier to get than nickel.

Industry's Problems in



"There cannot be much argument about dimensions"

Defense Inspection

**F. E. Allison, Chief Inspector
Wagner Electric Corporation**

THERE is nothing in Government specifications that is hard to meet in a shop that has any kind of an inspection system or tool designing system. And good shop practice will take care of specifications.

In World War I, we had a lot of problems. Fortunately, part of our personnel who are now in responsible positions helped to manufacture the essential Ordnance material at that time.

Industry has numerous problems which, in my opinion, will increase as we get further in this work. Not the least of these is manpower to operate machines requiring more than average skill, and that is where Tool Engineers will play a large part—in designing fixtures and tools to simplify complicated operations.

The large number of parts to be produced have put a heavy burden on them to design gages and fixtures so that inspection operations can be done rapidly and accurately. However, machine tools that fabricate the material into parts to be inspected are almost human through their ingenuity.

Job simplification will play a large part in producing all the planes, tanks, ships, guns, shells needed for winning an all out war. Complicated operations of all kinds will have to be broken down into many simple operations that can be handled by unskilled labor, and parts produced which will meet specifications; this can be done and is being done all over this country with the help of Tool Engineers.

Mass production is not new in many plants producing Ordnance material. For years, they have produced large quantities of goods for civilian use and the thousands of parts making up the assembly have had to be inspected so that no time be lost on assembly line and so that the finished apparatus will function properly. Inspection of Ordnance material is not different from other inspection in a plant that has an inspection division. But it can bulk large in a factory not accustomed to large scale production, or, where, because of the nature of the product, interchangeability has not been a factor. Thus, the precise dimension that must be maintained on almost all Ordnance work may prove to be a burden at the start of production.

There cannot be much argument about dimensions, as the parts are either within the limits specified or they are

not, but the test of an efficient inspection supervisor is the judgment he uses on the many points which cannot be put in a specification or on a drawing. If he does not decide wisely, he may increase the cost greatly and slow production.

We have, for a number of years, used women for practically all bench inspection operations. Within the limits of their physical ability and in proper surroundings, we consider them very satisfactory. Training of women is not greatly different from training of men, but it is necessary that more time be spent with them. In most cases they have never been in a metal working shop and noise and strangeness of surroundings tend to make women, more so than men, timid and nervous. So it is essential to put the new employee at ease. This may be done in several ways, such as by having her talk about herself, her plans, and ambition; by calling her attention to another woman worker who has made good and who had no experience when employed only a short time before; by stimulating her pride, showing you have confidence in her ability to master the work quickly.



"Nothing in government specifications... is hard to meet in a shop that has any kind of inspection system." Photo shows inspection of a gear-housing.

Training for inspection

You must go slowly. Explain carefully the most minute detail of the work. Many instructors do not pay enough attention to details because they know so much about the particular job that there is a tendency to slight what may be to them unimportant points, assuming that the learner should know these details. It is much better to give too

General MacArthur Wants It Now

Comments on government's problems in inspection by Colonel Roswell E. Hardy, St. Louis Ordnance Dist.

Several recent experiences bring to my mind a very important point. One manufacturer told me that General Knudsen had visited his plant and the General seemed quite pleased with the fact the plant was running, actually turning out a product required by the Ordnance Department, and was making more than its schedule originally called for. Then the manufacturer added, "You know, we just have an old plant. We don't have any new modern plant with the latest machinery, nothing much for the General to look at."

I thought the manufacturer was wrong. He should have been proud of the fact he had an old plant, he had old machinery, he had taken what he had, and was making what we want now. The fact he didn't have an air conditioned, modern machine shop, which will produce next fall or in 1943, did not enter into it. The fact he is getting the stuff now, with what he has got, is what we are interested in.

It seems to be quite a tendency, when we go to make anything, we want to get the latest modern machinery, the latest tools, establish a mass production basis where we get the cheapest cost, and if it takes us ten months, we have to take the ten months.

Now, General MacArthur is not interested in something ten months from now. He is interested in it now!

We should use what we have, and get something out now. Use your ingenuity and your experience, concentrate on using something we can get, now, even if it costs more and is not so efficient. But let's turn out some ammunition for the Army to use now. In 1943 we know we can do it. We can set up these beautiful new plants, equip them and turn out untold quantities, but we have a long gap before we get it.

"Government's Problems in Inspection," a talk by Capt. A. R. Burgess of the St. Louis Ordnance District, will be published in THE TOOL ENGINEER, pending War Department approval.

much instruction than too little, provided you do not go too fast and fog the mind of the learner; that is something an efficient instructor will be able to determine very quickly by the reaction of learner.

It probably would be well to introduce the new worker to one of the older employees who has a friendly disposition. Leave them alone for awhile.

Check with questions

When you come back, you can ask questions to determine how much of the instructions has been absorbed. Ask questions, but never ask a question that can be answered by "yes" or "no". If you say, "Do you think I have given you enough instruction so you can do this job now?" They say, "Yes, sure." You go on away and when you come back there is a lot of work spoiled. They said "sure," fearing you would think them a dunce if they said "no". Your interrogation should take the form of why, how, when, where, what. Then they must give you a positive answer.

Through questions that require some explanation, you may know whether the key points of your instructions have taken hold in the mind of the pupil. Do not, under any circumstances, lose your patience, as an impatient remark or gesture will undo a lot of hard work and cause the learner to lose confidence in herself. Loss of confidence may spoil an otherwise promising employee.

A further check on her knowledge may be had by watching how the work is progressing and by continuing to ask how, when, where, why, and what. Let more and more time elapse between checks, though always maintaining a reasonably close watch. As the worker demonstrates her understanding and interpretation of your instructions, leave her alone enough to develop a sense of responsibility and self-confidence. You will have trained another worker for the army of men and women which must produce the munitions of war.

Tool Engineer's place in inspection

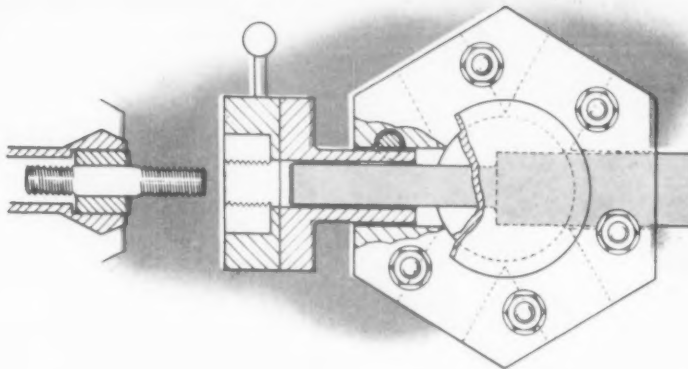
This may seem far afield from problems of inspection, but I cannot help but believe that the training of unskilled labor to perform detailed operations is the great problem of industry at war. And, if sixty-five billion dollars of materials is to be produced as has been estimated, in the eighteen months starting with January, this year, it will need a lot of training. It will need a lot of simplified operations on the fixtures and gages Tool Engineers must design so that more parts can be turned out per hour or per minute. There must be no slackening if we are to end this conflict in the shortest possible time. We have thought that our production of civilian goods had reached the peak per man, but it is going to be necessary to increase this peak by approximately fifty per cent to do this job.

The tool shops of this country have performed the miracle they were called upon to perform and have surprised the world by their production increases. But still the cry goes up, "We must have more!" Each machine tool must keep turning and producing to the utmost capacity every hour of the twenty-four, although we must not lose sight of quality in our effort to increase production. One piece spoiled is both labor and material lost, and we do not have an abundance of either.

*A Citation
for MEN
in WAR INDUSTRY*



He Saved Time Threading Studs



This "Idea for Victory" suggested by Norman Snyder, turret lathe operator in the plant of Vaughn Machinery Company, Akron, may not be altogether new to many machinists but it's a good one, worth passing along.

Operator Snyder makes a stock stop and sets it in a hex turret station. It can be adjusted to any length thread desired. Then little attention need be paid to endwise location of work piece in the chuck. Die head and hex turret feed forward until trip opens and chasers release. No time lost for indexing and back-indexing to position the next stud in the collet.

Hundreds of resourceful operators are sending their "Ideas for Victory" to Warner & Swasey to be published in "Blue Chips," a newsy shop bulletin sent free to turret lathe operators' homes. Make sure your operators—old timers and learners—are on the list to get "Blue Chips." They'll enjoy it and profit through reading it. Write

**WARNER
&
SWASEY**
Turret Lathes
Cleveland

YOU CAN TURN IT BETTER, FASTER, FOR LESS... WITH A WARNER & SWASEY

Backing Up The Men At The BATTLE STATIONS



(UPPER PICTURE)

Checking dimensions of Trunnion Bearing Boxes with a Starrett Micrometer No. 224 and Vernier Height Gage No. 454. Photos courtesy of Goss Printing Press Co.

(LOWER PICTURE)

Surfaces are scraped to limits of plus or minus 0.001"—an operation that calls for frequent checking with precision measuring tools. The operator in the background is using a Starrett Vernier Height Gage with Starrett LAST WORD Indicator attached. Starrett Dial Test Indicator No. 665 is shown in the foreground.



These scenes in the plant of the Goss Printing Press Co. show skilled American workmen building heavy caliber anti-aircraft guns for the U. S. Navy... a job that has already won the coveted Navy "E" pennant for excellence. In this plant, as in most plants throughout the "Arsenal of Democracy," Starrett Precision Measuring Tools are helping to maintain the highest standards of accuracy . . . helping to produce more and better planes, tanks, ships and guns for the fighting men of America.

THE L. S. STARRETT CO • ATHOL • MASSACHUSETTS • U. S. A.

World's Greatest Toolmakers

STARRETT

PRECISION TOOLS • DIAL INDICATORS • GROUND FLAT STOCK
HACKSAWS • METAL CUTTING BANDSAWS • STEEL TAP

Streamlined Valve Production for Stoves

IN common with most manufacturers of tapered cone valves, American Stove Company of St. Louis has made its tapered gas cocks by the ream, turn and lap process; i.e., the hole was taper reamed, the plug turned and the two lapped together with an abrasive medium. While insuring an excellent fit, the method was unsatisfactory for several reasons:—abrasive would imbed itself into the metal and eventually score, when "freezing" might occur; the method was slow and, while diametral fit was insured the endwise relations of the ports would vary as the diameter varied from the lapping. A thousandth of an inch, more or less, on the diameter would make considerable difference because of the slight angle of taper.

Valves, of course, are an important adjunct of a stove; they mustn't leak, must turn freely yet "stay put" under extremes of temperature, all of which entails a nicety of engineering and manufacture. The problem of fit is complicated with the newer, modernistic stoves, for where earlier models could be lubricated by the householder, the "streamliners" are not so accessible and, out of sight, out of mind. Hence, to suit modern conditions, the valve must be installed with a lifetime fit. So when, a year or so ago, American Stove developed its new "simmer set" gas cock, the company's engineers set out to improve manufacturing methods as well. In addition to a perfect, manufactured fit, they would also have interchangeability of parts, a difficult condition under the old method.

In the quest for manufacturing perfection, it was learned that a Detroit manufacturer of precision machinery had made marked progress in precision boring and the stove company's Tool Engineer recommended the purchase of their equipment. "No more lapping," he told the president. "We'll diamond bore instead." But diamond boring, was never used. It was found that less expensive carboloy tools, which impart a finish and fit—interchangeabil-

(Continued on page 98)

Use the VISUAL GAGE for the Precision Checking of



- 1 Width and Thickness
- 2 Height and Depth
- 3 Outside Diameter
- 4 Inside Diameter, Taper, Out-of-Round, Bell Mouth
- 5 Pitch Diameter of Screw Threads
- 6 Angularity of Surfaces or Between a Bore and a Surface
- 7 Run-out of a Roller with Respect to an Eccentric Axis
- 8 Parallelism of Surfaces or Edges
- 9 Two Dimensions Simultaneously

Suited to Routine Work of the
Tool Room • Production Shop
Inspection Department • Laboratory • Receiving Department

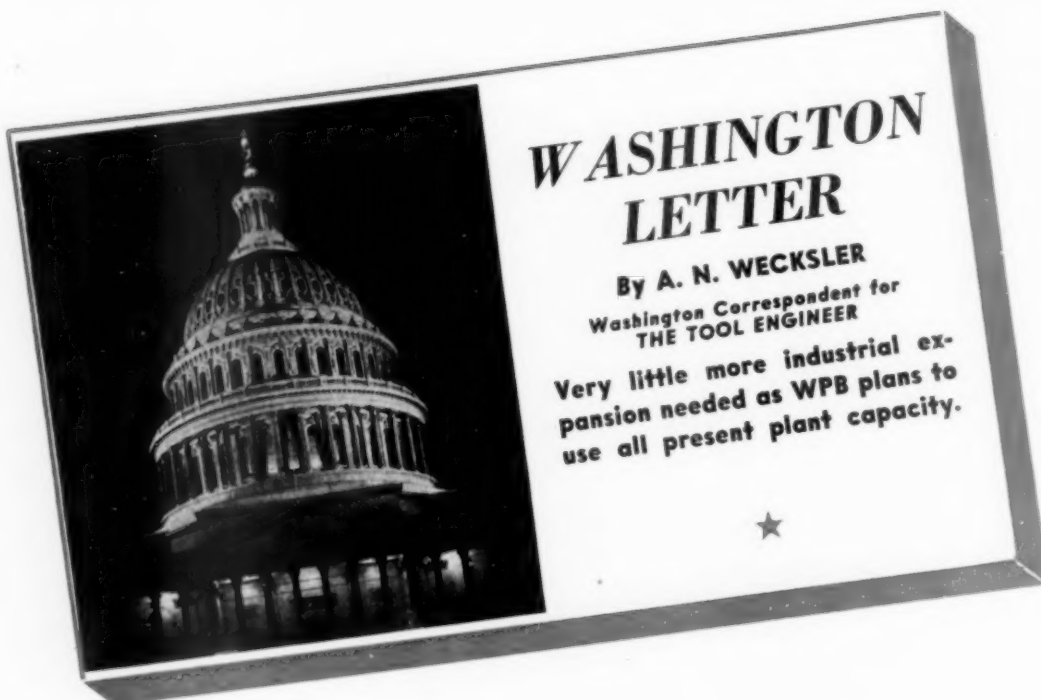
MAGNIFICATIONS: 10,000, 5,000, 2,000, 1,000 and 500 to 1
ALL MEASUREMENTS REFERRED TO PRECISION GAGE BLOCKS

THE **SHEFFIELD**
CORPORATION

Formerly—The Sheffield Gage Corp.

Gage Division • DAYTON, OHIO, U.S.A.





WAR Production is rapidly approaching a new phase, with major emphasis on immediate output.

The War Production Board will cancel out virtually all plans for industrial expansion, and proceed on the basis that present plant capacity and available materials should be fully utilized. Determination of the new policy was based on the growing shortage of materials and machine tools.

With the automotive industry rapidly approaching a high degree of conversion, it was decided that there would be insufficient materials to continue both plant expansion and capacity war materiel output.

The production strategy now will be to place the prime contracts with the larger of the converted industry units, and to use the smaller units to fill out the production lines.

This latter plan will call for widespread subcontracting. The major subcontracts will go to the efficient producers among the converted industries.

Stanley Plan

Currently under test is a plan to expedite subcontracting. Developed by James Stanley, WPB Production Division Consultant, the plan calls for a directory in which primes can list the work they will subcontract. This work

is listed in terms of the machine tools required to handle the job—such tools being represented by a system of code numbers.

Prospective subcontractors can classify their available tools using the same code, and by matching their available tools with those required to undertake the work, they are able to determine if they can qualify for the subcontract.

Stanley Plan directories have been issued weekly in the Chicago area to test the practicability of the plan. Its application on a national basis is under study.

Production Requirements Plan

Major development in wartime controls over industry is the blanketing of industry—with some exception—under the Production Requirements Plan. Beginning with the third quarter of this year, P-orders, under which industry has been operating, are being permitted to lapse, and industry is being required to operate under PRP.

In conjunction with this development is the newly formulated End Use Classification, designed as a medium of tracing the flow of materials through the hands of processors and fabricators to the finished item.

The End Use Classification is in essence a numeral code which is used to classify various end products, both war

and civilian. Prime contractors would assign the proper code numeral to purchase orders, and subcontractors and material suppliers are enabled to identify the end use in which their materials, parts or sub-assemblies are going.

Material Flow Check

In addition to giving the WPB an accurate check on the flow of materials—and thereby supplying the Government with an additional control element—producers of intermediate products will be able to classify the percentage of their output in terms of end use, and will be in a better position to obtain priorities assistance on essential requirements.

It is planned to eliminate many of the PD reporting forms necessary to effectuate the P-Orders. The priorities system will still be retained as the method of rating orders. However, it is indicated that the End Use Classification will lay the groundwork for a further approach toward allocations.

General Preference Order

Indicative of this trend toward allocations is General Preference Order No. E-1-b, which calls for an apportionment of each producer's monthly deliveries of machine tools to the Services, permit-

DIAL INDICATOR GAGES

Are Faster

EACH gage illustrated is outstanding in its performance. They are positive, quick to set up and fast in use. Their efficiency has been proved in many plants.

CYLINDER AND BORE GAGE - is sensitive, accurate, entirely mechanical, but free from excess friction and lost motion.

GRINDING GAGE - is a "best seller". It definitely saves time and material.

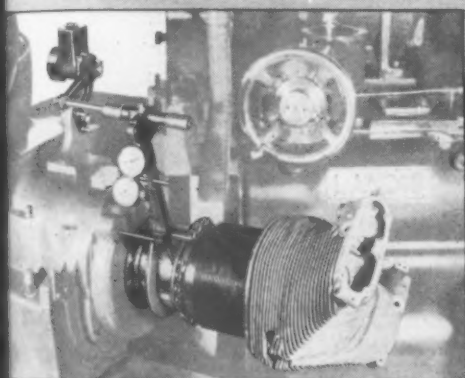
CALIPER GAGE - another very popular type. Has hundreds of applications.

GUN BORE GAGE - is entirely mechanical. Checks both "lands" and grooves without costly accessories. The head follows the rifling. - It's fast and accurate.

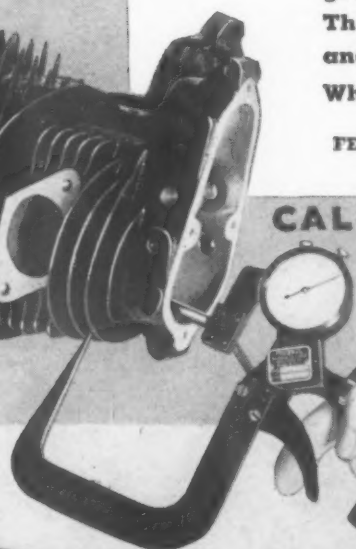
What have you to inspect?

FEDERAL PRODUCTS CORPORATION
Providence, Rhode Island

**CYLINDER
and BORE**



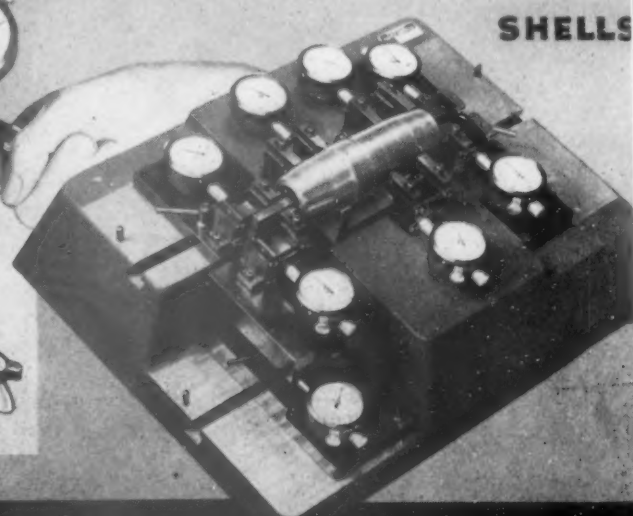
GRINDING



CALIPER



GUN BORE
All Sizes and Lengths



SHELLS

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PRECISION MEASURING INSTRUMENTS

Chicago • Cleveland • Detroit • Hartford • Los Angeles • Milwaukee • Montreal • Muscle
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titing the remainder to go to civilian and foreign purchasers.

Seventy-five percent of all tools produced are reserved for allocation by the Bureau of Ships of the Navy, the Bureau of Ordnance of the Navy, the Ordnance Department of the Army, the Air Forces, the Maritime Commission and Miscellaneous Government Requirements. Schedule A under Order A-1-b sets up the percentages of the Service pool which each of the six agencies can allocate.

Procedure through which the tools

from this pool may be obtained are through use of PD-3, PD-3A, PD-4, and under P-19-L.

The remaining 25 percent pool of tools is available for civilian requirements, including Canadian and foreign.

Apportioned Between Groups

The WPB Machine Tools Subcommittee and the Requirements Committee each month apportion the amount of tools that will be reserved (out of the 25 percent pool) for civilian, and those going to foreign account.

Tools for civilian and Canadian needs are obtained through application PD-1A. Such applications are reviewed by the Priorities Section of the WPB Tools Branch, and by the Army, Navy and Munitions Board.

Applications for tools for foreign account are reviewed by the Lend-Lease Administration, and upon approval automatically are assigned A-1-a ratings.

Price Ceilings

Most important price question as it affects production is to what extent price ceilings will control prices of machines and parts, especially parts and sub-assemblies going into war machines.

Price Regulation No. 136 provides a pricing basis for machinery, and the Office of Price Administration has adopted a general policy of watching war contracts to guard against "excess" profits on war production.

WPB actions affecting the tool industry are as follows:

April 22—Effective date of Amendment No. 1 to General Limitation Order L-83, restricting output of industrial machinery, delayed until May 15 to avoid disruption of schedules in plants preparing to convert to war output.

April 22—Order M-6-c, covering nickel bearing scrap, requires segregation of scrap containing more than one-half of one percent nickel by weight, and permits its melting only for uses authorized by the Director of Industry Operations.

April 27 — Limitation Order L-108 bans fancy painting and finishing of metal-working machinery after April 30. The order provides that only one coat of primer or sealer may be applied to new metal-working equipment. No filler may be applied, and not more than two coats of paint, enamel or lacquer may be used. Any color other than "old machine-tool gray" for the final coat of paint is prohibited.

April 29—Price Regulation No. 136 places machines and machine parts under price ceiling at substantially the same levels of prices prevailing October 1, 1941. Regulation effective June 1, 1942.

April 29 — Maximum Price Regulation No. 138 brings standard ferromanganese under price control at close to levels prevailing October 1 through 15, 1941, taking some cost advance factors into consideration.

*I*N the production of brass and aluminum fuses the reduction of "down time" to the least possible degree is all important!

Cutting operations on multi-spindle automatics, such as reaming, eccentric drilling, tapping and threading, respond to the application of Stuart's "Super-Kool" No. 151 Brass Cutting Oil, or Stuart's "Super-Kool" No. 1M Aluminum Cutting Oil frequently with a surprising improvement in tool life and finish.

For All Cutting Fluid Problems
D. A. STUART OIL CO.
 Chicago, U.S.A. • LIMITED • Est. 1865
 Warehouses in All Principal Metal Working Centers



USE THIS METHOD TO GRIND CARBOLOY TOOLS QUICKLY—EASILY—EFFICIENTLY

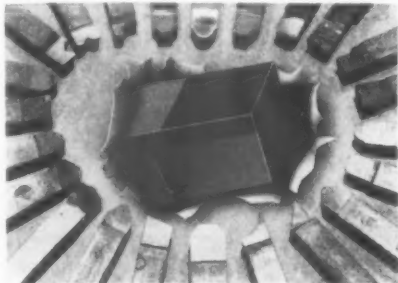
Correct grinding of Carboloy tools is important! A poor grind wastes carbides, delays vital production and increases costs. A good grind provides long, trouble-free life between tool changes, conserves tools and speeds production.

When established procedure is followed, Carboloy

tools can be ground quickly, efficiently and just as easily as ordinary tools. Below are a few of the more important points to observe. Detailed instructions are available upon request. These are contained in a 32-page manual on Carboloy tool design, application, brazing and maintenance.

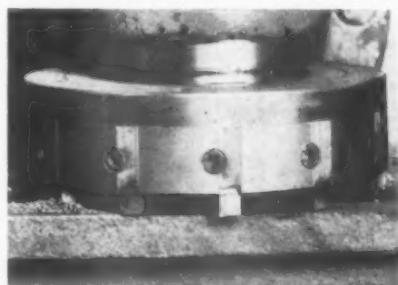
Use Standard Tools for Economy, Flexibility and Prompt Delivery

Carboloy Standard-Stock tools are available in 10 styles, a wide range of sizes and in general purpose grades for steel, cast iron, non-ferrous metals and non-metallics. They are adaptable to 80% of all turning, facing and boring jobs.



One user makes 200 "Specials" from one style of Standard

Many users maintain a stock of these standards in their tool crib and quickly grind to special shapes as required, ready for the job usually in less than one hour. One user (see cut) quickly adapts 200 special shapes from one style of Carboloy standard tool. Another (see cut) uses these standard tools as blades in face mills.



Another plant uses Standard Tools as blades in face mill

For a short cut to speed up—use Carboloy Standard Tools. Catalog GT-140.

Use only the soft silicon carbide wheels recommended by wheel manufacturers or your carbide tool supplier. The following wheels are recommended for grinding single-point straight shank Carboloy tools:

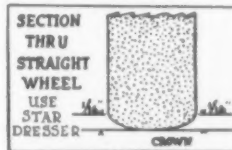
ROUGHING	Wheel Specifications	
	Carborundum	Norton
Silicon Carbide Wheels (Not recommended in sizes less than 10" dia.)	G-60-R-W	3960/1 I 7
Diamond Wheels (For Carboloy Tip)	100	100
FINISHING		
Silicon Carbide Wheels (Cup).....	G-100-S-W	39100/1 H + 7
LAPPING		
Diamond Wheels.....	240 Grit	220 Grit

1. Use Correct Grinding Wheels

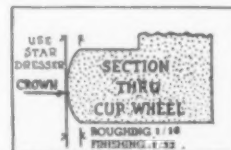
2. Dress Wheels for Rapid Stock Removal

Correct dressing of wheels is important in safely obtaining rapid stock removal. Method shown enables you to keep area of contact against tool at

a MINIMUM—avoiding generation of excessive localized heat—an absolute essential when grinding safely and rapidly.



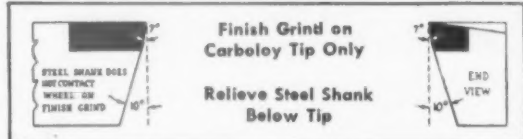
For Roughing



For Roughing and Finishing

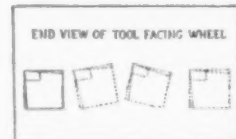
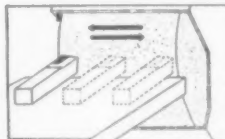
3. Use Double Angles to Insure Good Finish

When rough grinding, ALWAYS grind side and front relief angles 2° to 5° greater than finished angle desired. By this you avoid grinding on the steel shank when finish grinding. Steel loads wheel rapidly—prevents you from obtaining best possible cutting edge (Use regular abrasive wheel for grinding steel.)



4. Important! Keep Tool Constantly Moving

The following movements prevent excessive localized heating in the Carboloy tip and assure uniform wheel wear: Keep tool moving back and forth across wheel at all times while roughing, finish grinding and lapping. Keep tool ROCKING during roughing and finishing, as shown.



General Hints

If top face needs grinding, always grind it first. Then grind: (1) Front relief; (2) side relief; (3) radius. Complete each cycle for roughing, finishing, lapping.

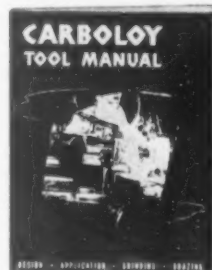
Use rigid, carbide tool grinders equipped with adjustable table rests and graduated dial to obtain correct angles.

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TOOLS • DIES • DRESSERS
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• WEAR RESISTANT PARTS •
CARBIDES

FOR THE MANUFACTURING • MINING • TRANSPORTATION • CONSTRUCTION INDUSTRIES

April 30 — Limitation Order L-94 places all power producing utilities under WPB control in the event a power shortage develops. In such a contingency, the Division of Industry Operations will declare the area where power becomes short a "power shortage area", and will restrict civilian and non-essential consumption of power.

April 30—Prices of non-ferrous foundry products fixed under Price Regulation No. 125 at substantially the same levels as prevailed during October 1-15,

1941. Schedule effective May 11.

May 1—Metallic zinc placed under allocation control by amendment to Conservation Order M-11, effective June 1.

May 1—Machine tools placed under limited allocation by General Preference Order E-1-b (referred to in body of report).

May 2 — Firmer control regulations over segregation and sale of aluminum scrap under amendments to Supple-

mentary Order M-1-d.

May 4—General Iron and Steel Conservation Order M-126 prohibits the use of ferrous metal in listed consumer items.

May 4—Revision of Order M-21-b, covering iron and steel warehouses, prohibits warehouses from accepting deliveries except under quotas established by the Director of Industry Operations. Brings warehouse order into conformity with terms of Order M-21 (Producers Conservation Order).

May 6—Indian kyanite (aluminum silicate used for furnace linings and able to withstand high temperatures) made subject to allocation control under Order M-143.

May 7—M-9-c, covering copper and copper base alloys, revised, banning use in an additional list of civilian items.

May 7—Amendment to Order M-9-a limits shipments of brass mill, wire mill and foundry copper and copper base alloy products, except on A-1-k rating or higher, with the exception of specific instruction by the Director of Industry Operations.

May 11—Production and sale of electroplating and anodizing equipment restricted under General Limitation Order L-110, except on orders rated A-1-j or higher.

May 13—WPB announces plans for the purchase of "inactive" stocks of copper and brass products, for which higher than scrap price will be paid.

May 15 — Interpretation of Order E-1-b requires purchasers of machine tools to include specifications and detailed description of tools with purchase order so that the producer can schedule the tools in his production schedule.

May 19—Sale, delivery and production of heavy power and steam equipment restricted to orders for defense agencies, United Nations, Lend-Lease and orders other than repair and maintenance, rated A-9 or higher.

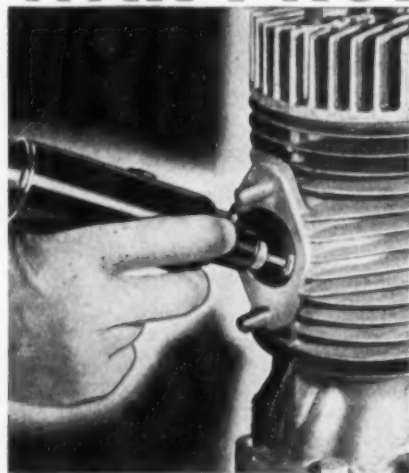
May 20—Directive No. 4 under E-1-b provides that of the 25 percent pool of machine tools for foreign purchase and essential U. S. and Canadian industry, the Lend-Lease Administration will recommend recipients of machine tools for foreign account.

SPEED-UP

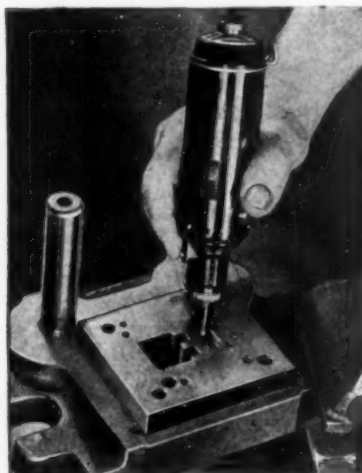


WAR PRODUCTION WITH DREMEL

MOTO-TOOLS



MOTO-TOOL is ideal for a variety of operations in wood, plastics, metals, porcelain, glass and other materials.



Tool makers find MOTO-TOOL'S sensitive finger-tip control indispensable when shaping intricate or irregular metal dies.

Here's the rugged little tool that is speeding war production in plants from coast to coast. Use it any place where there is an AC or DC outlet and watch the way it does better grinding, buffing, drilling, finishing... faster and easier. Precision-built for precision work, MOTO-TOOL is first choice for the hard-to-get-at jobs. Shock-proof bakelite housing... oil-sealed bearings... balanced armature to eliminate vibration... weighs only 13 ounces. Used by hundreds of other arsenals of Democracy, such as General Electric, National Cash Register, Westinghouse, Remington Arms, Ford, Nash-Kelvinator, Consolidated Aircraft and Northrop Aircraft, Inc.



This complete MOTO-TOOL kit takes the place of more expensive equipment. Has all accessories for all types of grinding operations, with a place for everything, and everything in its place. Contains: One Model No. 2 MOTO-TOOL with 1/4" collet, 4 Emory Wheel Points, 1 Dressing Stone, 8 Carving Cutters, 1 Steel Saw, 3 Bristle Brushes, 1 Steel Cleaning Brush, 1 Screw Mandrel with sanding discs, 1 Shoulder Mandrel, one 1/2" Drum Sander, one 3/32" and one 1/16" collet.

Packed complete in rugged felt-lined hardwood cabinet case \$23.50
Dremel No. 2 MOTO-TOOL only 16.50

DREMEL MFG. CO.
T442-F, RACINE, WIS.

MAIL THIS COUPON TODAY

DREMEL MFG. CO., T442-F, Racine, Wis.

Please ship the following:

- ☐ Complete Moto-Tool Kit No. 2 (\$23.50)
☐ Moto-Tool Model 2 (\$16.50)
☐ Catalog of Dremel Tools and Equipment

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Subject: Engineering THE TOOL ENGINEER

SOME day you might have a visitor from THE TOOL ENGINEER drop in on you and start asking a number of questions about your reading of this magazine. Then, unless you hadn't started reading the current issue, he might sit down with you and go through the copy of the magazine, checking off on his reporting forms exactly what you had read, how you had read it, and what you got out of it.

You probably would find that the operation had captured your curiosity and interest to the point that when he bowed himself out you would have spent considerably more time with him than you expected. For in the process he would have let you in on an entirely new kind of "tool engineering" job, the tool engineering job of a business magazine.

It is just as important to us to keep our working tools sharpened up, modern and in good order as it is to you. Our tools are largely manuscript, pictures, charts, diagrams, paper, type and ink. The job we turn out is only as good as the tools we employ and the intelligence with which they are used. The proof of the pudding is not what *we* think about the job, but what you, the reader, gets out of it.

EDITORS are not infallible. They've got to be good. They've got to know their field and what it wants. But they can only be sure of that, particularly in a fast-moving field like ours, through continuous analysis of the readers' requirements.

For example, an article may come to the editor's desk from some well known Tool Engineer on a subject which in the editor's judgment should be of wide interest to our following. But the editor, or even the author, cannot possibly know either how large a proportion of the readers will be interested enough in it to read it, or how much benefit they will get out of it when they do read it. The editor asks himself questions like these: "Is this really new stuff?" "Is the story too long or too short?" "Too technical or not technical enough?" "Does the title describe the story clearly enough so the reader can tell whether he wants to read it?" And many others.

The research man gets the answers to these questions and a multitude of others. Then these answers go back to the research office where they

are recorded on punched cards and a series of exact tabulations is prepared to show just what the "reader performance" has been on the issue as a whole and on each editorial feature. From the report that comes to the editors, they know for example, what stories were read the most and what stories delivered the most value to those who did read them. Likewise, of course, which ones were so poorly read that the space might better have been given to something else.

THE result of this work, naturally, is to improve the value of the paper to its readers. Successive surveys prove just how effective such attempted improvement has been.

While the research man comes into you as a representative of THE TOOL ENGINEER, he is actually the employe of an organization specializing in this work for a number of leading publications. He spends all of his time on surveys of this kind, first with the readers of one magazine and then with those of another. That naturally makes this work all the more valuable to us, as our reader performance can be compared with that of other publications served by the same organization.

BEHIND the field work is a highly organized technical process developed by these people to analyze and appraise the reading results. They have translated what have previously been intangibles of "readership" into very tangible facts and figures. As a part of their technical process, for example, every "reader traffic interview" is translated into a series of eight punched cards, in which all the facts about the reader and his reading are recorded and coordinated in such a way that almost anything we want to know can be readily tabulated.

So this is our "product laboratory". It is putting engineering into the publishing business to a degree that publishers of a generation ago never dreamed of. It is one of the many things we are doing in our efforts to make THE TOOL ENGINEER of increasing interest and value to you.

The Editors

Bits & Pieces

Highlights of Discussion Period Following the
A.S.T.E. Convention Talks Published in this Issue.

What is the method by which prime contracts and sub-contracts are let from Washington to the manufacturer?

The automobile industry serves as an example — when automobiles were curtailed, a War Production Board

man went to Detroit, where the automobile was the prime income-producing industry in the city. He had a talk with all the interests involved, namely, both labor groups, the city council and the Chamber of Commerce. He discussed ways and means of getting a prime contract into the city, into the industry that was there. Fundamentally, it was quite a sim-

ple thing. That is, you have two parties. You have the buyer and the seller, and the agent. The War Production Board Contract Distribution Division could act as the agent for them, so they would not have to send representatives from all these different groups to Washington, to Chicago, to Kansas City, everywhere, shooting their wads in all directions. Going direct by one route, they would get there sooner, better and cheaper. They agreed to do so.

Through contacts that WPB set up, one of the auto firms submitted a proposal for conversion, showed pictures of the plant, aerial photographs, photographs from all angles and all interior photographs; plans of how the plant was at present, then a section given over to how the plant would be, new layouts, new machinery, everything; a list of all the machinery necessary, with its cost, and a breakdown of machine-loads. Then a curve plotted showing when production would start and how it would be stepped up until it reached the maximum.

**See Page 75, this issue,
for Clifford Ives talk
on Defense Contracts...**

NOW...PROFILOMETERS PROVIDE *Greater* PRODUCTION USEFULNESS



THE POWER PACK: Profilometers are used for the measurement of surface roughness and provide direct dial readings in true inch units. Until recently they have all been self-contained with batteries which permitted full portability. With the increasing need for uninterrupted use in one location, particularly on three-shift inspection operations, the Power Pack was developed so that power could be supplied from a 115-volt 50-60 cycle AC source. Instruments now in use can be converted or new Profilometers can be specified to include the Power Pack. It is available at only slight extra cost.


THE MOTOTRACE: The newly designed Mototrace provides improved mechanical tracing, permitting the tracer to be drawn without vibration across the piece being measured. With it, a length of stroke from $1/32''$ to $2\frac{3}{4}''$ can be obtained. It is especially valuable for measuring fine surfaces, softer materials, awkward shapes, small areas, and surfaces such as those in small holes, adjacent to shoulders or bosses, and on gear and hob teeth. Many of its functions could only be duplicated by the cutting of specimens to expose the surfaces to be checked.

WRITE FOR FULL INFORMATION ON THE PROFILOMETER
AND ITS VARIOUS ACCESSORIES

PHYSICISTS RESEARCH COMPANY
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That was submitted to the armed services, and in due time a contract was awarded. It will probably employ fifty percent more men than were originally employed.

That is an example of how WPB assisted in the obtaining of that prime contract. They have found that the best way to get a prime contract split up into subcontracts is to make preparation for that splitting up before the prime contract is awarded. Then the prime contractor understands where he can get the subcontractors, the subcontractors are already prepared, they know where they are going to get this work, and if it doesn't take the armed services too long to get the prime contract, the subcontracts provided for are still available. Where it takes a little longer, in that case there are alternate subcontractors prepared.



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JOB** that might come up in any tool
room. This Lodge & Shipley reliev-
ing attachment is used for right or
left hand leads, internal or external,
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ENGINE



TOOL ROOM

AUTOMATIC LATHES



WE FLY THE "ALL NAVY" "E"

Concerning the conversion back to lead babbitts for bearings, has anything been done with the addition of silver to lead for bearings?

In aircraft engines, a copper-lead-silver bearing is now being used which is very successful. Three or four years ago they used a hundred percent silver bearing. It was fairly suc-

cessful, not as successful as the bearing they are using now, which is about 10% lead, 30% or 40% copper, and the balance silver.

The old silver cadmium bearing had the disadvantage of corrodibility. The automobile people used that until they began to have frozen bearings due to the fact the oil oxidized and corroded those.

Years ago, we had a calcium lead bearing. Ford used it as a thrust washer on his model T. An extension of that has been a calcium lead bear-

ing with a whisper of silver. It takes shock, but it is not too easy to work. Because of the calcium in it, it oxidizes pretty badly. In Diesel engines, however, it has been ideal for connecting rods and main bearings.

The addition of a small part of silver to fairly high grade Diesel engine babbitt does increase the hardness of it.

It is possible that the engineers today are many times specifying steels that must be from an electric furnace rather than open hearth where it is absolutely unnecessary?

This seems to be the case. But it is a perfectly natural thing to expect from engineers who have been trained in the idea that the best is none too good, so, they have specified those things. But there is no doubt that in many cases a cheaper steel could be used.

A number of changes have been made in steels. We have gone away from nickel chrome steels. They are just plain out. We have gone to chrome-moly, and they have been very satisfactory. Actually, before substitutes were necessary, some metallurgical engineers preached the chrome-moly steels to the designing engineers.

A talk on substitute materials appears on page 81—this issue.

We have made some substitutions of straight moly steels. We don't know too much about them.

On tool steels, restrictions on high tungsten steels made it necessary to build a percentage of very low tungsten for each pound of the other. Chrome-moly steels, which were substituted for tool steels worked fairly well for single point tools that can be taken out and ground. They are not so good for punches and dies and things of that kind. There, some manufacturers went to high chrome and high carbon for punching out the eliminations of motors and similar equipment.

High chrome and high carbon have good life, but they warp. So instead of making a multiple punch, they made a ring and set in pie-shaped segments of this steel. Each one could only warp so much and that meant after hardening they didn't have to grind quite so much.

War Program for the HOME FRONT

TO WIN THE WAR—and to win it decisively and without delay—every one of us must have the will to produce—the will to do more than we've been doing, and the will to do it more quickly.

Such a spirit will give us the vital war production we need. And production—man power, raw materials and machines—will give us the necessary ships, planes and guns.

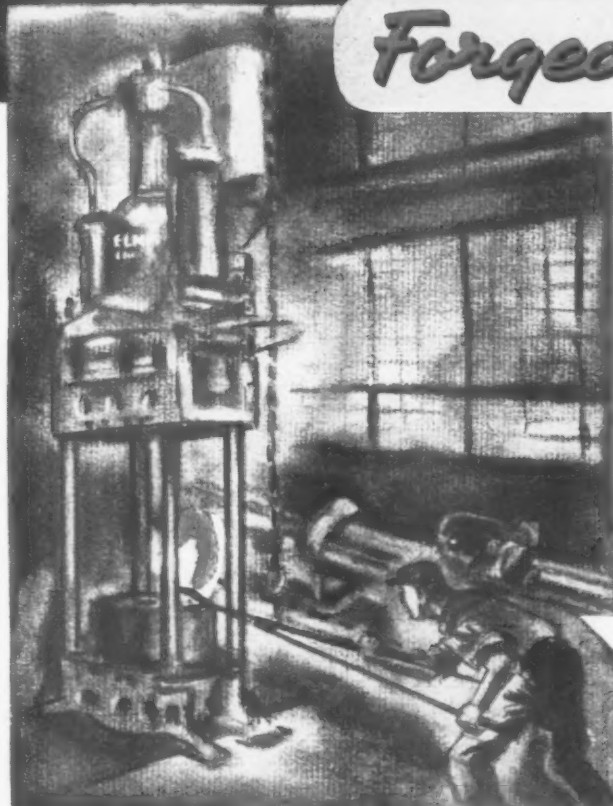
Machines and tools are needed to win the war! That's why we're proud to say that our entire production of Davis Boring Tools is Uncle Sam's for the duration.

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High Powered Shells



Forged on Presses

Victory shells, large and small, are being forged and nosed on hydraulic presses built by Elmes . . . Moreover, Elmes presses are turning out parts for guns, ships, planes, tanks and other war equipment. The Elmes line of hydraulic machinery and equipment is complete . . . including forging presses, forming and drawing presses, plastic molding presses, straightening and bending machines, accumulators, pumps, valves and accessories. Since 1851 this organization has been gaining experience in the design and manufacture of precision equipment . . . which experience today is available to users of hydraulic installations.

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METAL WORKING PRESSES • PLASTIC MOLDING PRESSES • PUMPS
EXTRUSION PRESSES • ACCUMULATORS • VALVES • ACCESSORIES

Germany has been making ersatz materials for a long time. Has there been any research on the work that has been done there in the last few years?

Complete reports show that many German substitutes are impractical. But, their whole economy is built around shortages. They go to alum-

inum and magnesium for the most absurd things because they could get them where they couldn't get copper. There are many substitutions of that kind.

Another thing they have done is go very largely to some zinc base die castings, and zinc combinations which will work after a fashion, but which don't work well enough.

Can powdered iron be used to replace rolled material?

Armatures for small circuit breakers can be made out of powdered iron which is repressed and has as good magnetic characteristics as ordinary cold-rolled steel.

That is not going to be a temporary thing, because you get the piece and put it to work. You have no machining to do on it, and furthermore, you can cut off some ugly-looking corners without spending any money on it.

These armatures have been highly successful and will be fully as cheap, if not cheaper, overall, than the ones made out of rolled material. This may be the first article produced of powdered iron with good enough permeability to serve instead of roll material.

Women in Industry?

In a New England plant, producing broaches, a shortage of male help has resulted in rather extensive employment of women. Their work includes roughing operations on a planer. One woman operates a six-foot bed planer, roughing broaches up to and including tools of 1/34 inches in diameter. They were also using women grinding broaches, and on numerous other machining operations. In many cases, an older mechanic trained the girls on a particular job. According to the plant superintendent, the women are doing fine jobs, in fact are getting better production than men were showing. Asked what might be the reason for this, the manager stated that the women have a keen interest in getting the material out because their husbands have sailed to battle from a nearby submarine base. They figure that their work is of direct value to their own way of living. In this same plant, the observer was interested to note that these women were not the least bit worried about getting their hands dirty.

Valves

(Continued from page 87)

ity — met the demanded standards of perfection. With the precision machine, both male and female tapers are held to limits so close that the ports align endwise plus or minus .002, implying remarkably close diametral precision. The result is a *lifetime* valve, replaceable and interchangeable, free from imbedded abrasives and requiring no lubrication beyond that applied at the factory.

THE TOOL ENGINEER

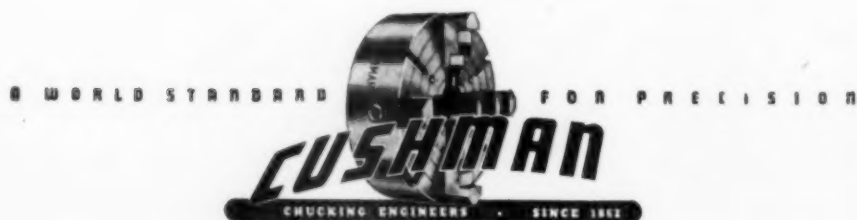
CUSHMAN CHUCKS are HELPING...

to BREAK the BACK of the AXIS



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WITH THE VAN NORMAN NO. 3-V VERTICAL

This modern vertical milling machine has the spindle mounted on a sliding ram. Simply by moving the ram in or out, the depth of the throat is varied so that the spindle can be more closely coupled to the column for average milling operations . . . which means an increase in range of set-ups and of work that can be handled.

This adjustable throat is only one of many important Van Norman advances in the design of vertical milling machines. Also notable are the quick-change levers, located on the ram, which instantly provide 18 spindle-speed

changes . . . adaptability for step-milling by mounting 4-position dial indicator stop on the ram . . . single-lever feed selector . . . and directional controls of 18 feeds, located both at front and rear. These new features, together with extreme rigidity and accuracy, enable the Van Norman No. 3-V to set new performance-marks in output, adaptability and ease of operation.

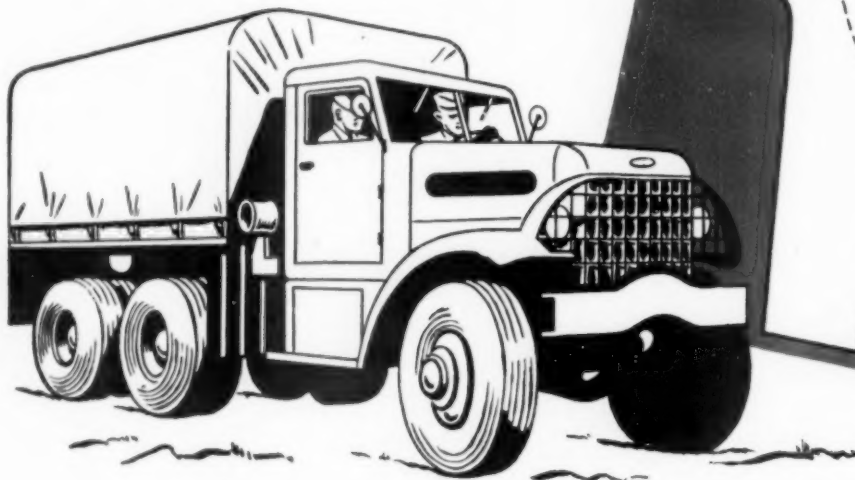
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18 Feeds: $\frac{3}{8}$ " to 32"

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Detroit Broaches are "War Production Tools". They are in use in every industry where fast, accurate metal-cutting is of vital importance in the manufacture of war materiel.

Illustrated is a typical operation performed on universal joint parts by broaches designed and built by the Detroit Broach Company. The contour shown was previously produced by milling. By broaching, production has been increased tremendously . . . tool tolerances are maintained for a much greater length of time . . . and the finish secured is far superior.

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The Function of the

Machine Design Department

in the Product Shop Organization



Mechanical Engineer

ABC pointers to help the engineer meet problems of shop expansion.

DURING the last ten years the increasing complexity of modern manufacturing operations has caused many large companies to establish a new type of organization, dividing production activities into groups, each closely connected to a single product.

In carrying out this idea, the old style of grouping by function has been largely abandoned. Instead of division of machinery into departments by operations, such as the screw machine, light punch presses, heavy punch presses and finishing departments, equipment is divided and located at the most advantageous place with reference to the particular line of product.

What Are Product Shops?

This idea is applied to engineering, cost, and production organizations, with the object of establishing an integrated unit whose sole interest is the

production of a single line at the lowest cost. The units thus established may be called "product shops" even though they are not separated into separate buildings and locations.

This form of organization, while of unquestioned value, leaves something to be desired with respect to the engineering of machine construction, procurement and maintenance; tool construction and repair.

New Relationship

What are the engineering functions of the machine design department and its organization with respect to machine construction, procurement, and maintenance, and to the various machine shops and repair shops?

The organization described here is a composite of the most desirable features of several systems combined to suit the particular purpose. It does not conform exactly to any particular existing organization.

Under the old functional system of organization, where one group is concerned principally with operations carried out on a single type of machine, the engineers concerned become specialists, intimately acquainted

with that special type of machine. Under this set-up, the development of new machines falls naturally in the field of the functional engineer.

Engineer's Job Grows

In the product shop, however, the variety of machinery with which the engineer is concerned is largely increased. His situation is that of the engineer making a single type of product. The primary interest of the engineer is transferred from the equipment to the product, which is the object of the reorganization. In a similar situation in a small shop, he buys the necessary equipment. In a large shop, having adequate machine building facilities, a different solution is required.

Since the engineer furnishes information for production, the machine design department should be so organized as to have the same relation to the machine building shop that the product engineer has to his product shop. The relations between the product engineer and the machine design should approximate those which would exist between a customer and the engineering department of a sup-

plier of equipment. To do this, the machine design department must be much more than a pool of draftsmen maintained for the convenience of the product engineer.

The first essential is that the machine design department have ideas and sell them to the product engineers. The second is that it assume the responsibility of producing successful designs. The third is that it assume the responsibility for engineering control of the machine shop to insure the delivery of machines in a reasonable

time at a reasonable cost.

The primary function of the machine design department is the supplying of the engineering information necessary for the construction of machinery, either by the plant machine shop or by an outside supplier. For this service, it is organized to furnish blue prints, drawings, specifications, or any other information as may be required for the procurement of machine equipment.

The organization of the machine design department should include the

necessary personnel to solve engineering problems as well as the draftsmen and designers to prepare the drawings. Under the department chief should be a group of qualified design engineers who are responsible for the various projects, a chief draftsman who is responsible for the preparation of the drawings, and a chief clerk who is responsible for filing, records, costs, and other routine. Contact with the product engineers, should be through the design engineers, who will collect information, supervise the preparation of layouts, act as consultants to both the product engineers and the designers and draftsmen and exercise general supervisory control over the various projects assigned to them.

These design engineers should be specialists in various types of machinery as well as men of ability in the general field of machine design and construction.

The chief draftsman should be responsible for the cost, quality, and rate of production of the drawings. His chief function is supervision of the draftsmen and checkers and not engineering, which is the function of the design engineer. He must keep in close touch with the design engineers in order to schedule the production of drawings to meet the requirements of the various projects.

The chief clerk is responsible for the routine. He collects and distributes costs, sees to filing and blue print service, and supervises all clerical and routine work in the department.

Under the chief draftsman, the designers and draftsmen are organized in teams as may be required to handle the various jobs most expeditiously. The composition of a typical team would be one designer, one No. 1 draftsman, and two detailers. In addition, individual draftsmen may be assigned to assist the design engineers by preparing sketches and layouts, to bring drawings up to date by making changes found necessary in the shop, and in other miscellaneous work which may be required.

The checkers also report to the chief draftsman. Their duties are to check drawings for dimensional errors, readability, and general quality. For this reason, they should make their check on a blue print rather than on the tracing since the print is what the shop works from. Where necessary, they may make scale layouts to check



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Two Handy Nortons for the Tool Room

THE Norton Multipurpose Universal Grinder is well named—for cylindrical, internal, chucking, face and cutter grinding operations can be performed with it. Furnished in three sizes swinging 12", 14" or 16" and each in 36", 48" or 72" lengths between centers, it is an all around, precision grinder that can do a variety of jobs. Rugged enough for roughing operations—accurately built for precision jobs.

The Norton No. 2 Cutter and Tool Grinder is a universal, wheel slide type cutter grinder with multiple controls affording operation from the front or either side. It has an anti-friction bearing wheel spindle capable of mounting a grinding wheel on both ends. The wheel head can be set at any horizontal angle and the table rolls on balls which run between hardened steel ways. Cylindrical, internal and surface grinding operations are performed with the greatest ease, while many attachments can be supplied for such operations as the grinding of gear cutters, hobs, circular form tools, long reamers and so forth.

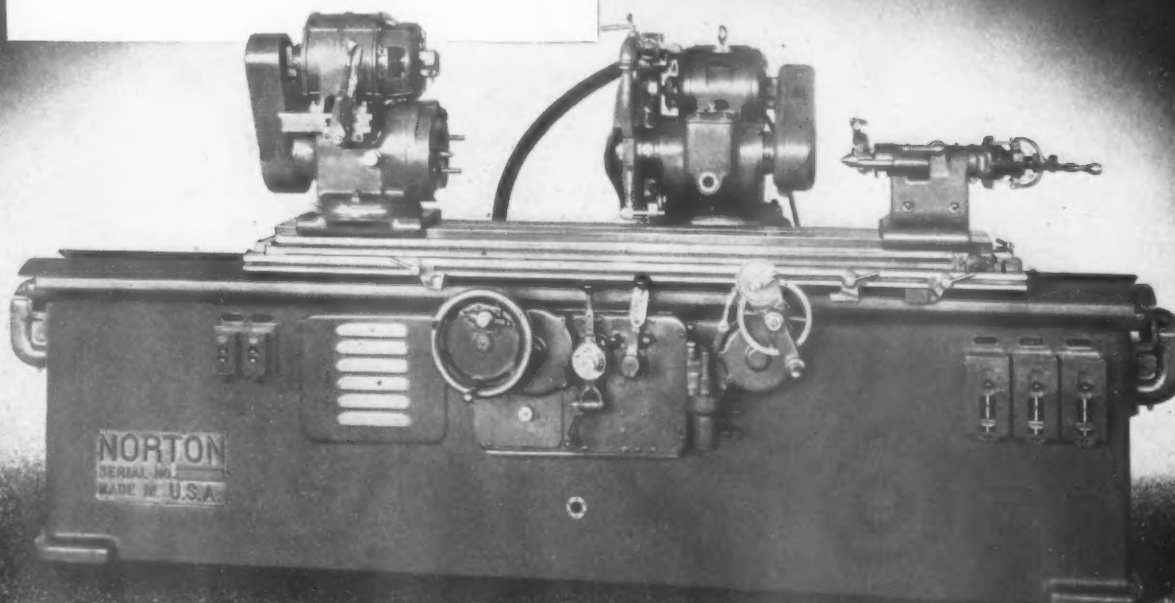
Catalogs on either or both machines on request—no obligation.

NORTON COMPANY, WORCESTER, MASS.

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NORTON
GRINDING MACHINES



dimensions.

The distribution of work between the members of the teams should be methodical. The general plan is that the designer shall make the layouts, the detailers draw the details from the layouts, and the No. 1 draftsman makes the assembly from the details as they are completed. The division of work between the various team members, as well as the composition of the teams, varies with the jobs on hand. This system reduces the time required to get out drawings consid-

erably over the one man per job system, as well as lowering the cost of drawings. This system also has the advantage that jobs may be overlapped since in many cases the No. 1 man and the detailers can complete a job after the layouts are made, releasing the designer to start a new job.

Chief Draftsman's Job

The supervision of the division of work between the team members is a duty of the chief draftsman and not

of the designer who, it should be remembered, is chosen for his ability as a designer and not as an executive.

Systematic Checking

Checking should be done systematically and according to a prepared plan. It should include:

1. Dimensions
2. Legibility
3. Adherence to standards
4. Check of screws and fastenings to reduce variety
5. Fits and finishes
6. Hardening requirements
7. Materials.

"Never a DULL Moment!"

with

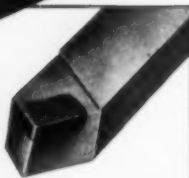
TECO Carbide Tools



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TECO Carbide Tools hold their cutting edges much longer, producing more pieces between grinds. Therefore, you get more productive hours out of your machines because you waste less time for re-grinding and re-tooling. Moreover, TECO Carbide Tools cut at higher speeds, maintain accurate tolerances and reduce rejects. All of which adds up to greater production—the lifeblood of America's war effort. You can get TECO Carbide Tools promptly in grades and sizes for practically every machining need. Send details of your requirements.

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"The machine design department must be more than a pool of draftsmen maintained for convenience of product engineer."

Workability of the design is the responsibility of the design engineer.

Another function of the design department is to furnish engineering information, but the completion of a set of drawings and the delivery of prints to the shop ordering department is not a fulfillment of that function. The economical construction of equipment requires the cooperation of several departments besides the machine shop, such as the purchasing department, stores department, millwrights, foundry, electricians, etc. A number of these departments cannot get the information they require without analysis or interpretation of the drawings.

Much of this information can be easily collected by the draftsman or design engineer during the design

THE TOOL ENGINEER

If you think of
Hanna Cylinders
 you will find a simple
 answer to smooth
 dependable power for
 many drive problems



Hanna *Air* Cylinders



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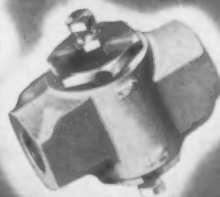
These are typical of the complete line of standard models,
 air and hydraulic, ready to serve most every purpose.

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period in the form of bills of material and specifications, eliminating the necessity of analysis for raw material and purchased items by the shop order department, thus reducing the time required to get the order into the shop and expediting the delivery of material. On subsequent orders, a great deal of clerical work is also eliminated by the avoidance of repetition.

If the bills of material, instead of appearing on the various sheets of drawing, are collected into consolidated bills of material, purchased

parts (screws, nuts, etc.) and special apparatus, so that requirements can be made available immediately to the procurement organizations, the shop order and analysis departments can devote their attention to the determination of the best routing of work and the scheduling of machine operations and the cost of analysis and estimating is reduced.

Summary

The successful functioning of the machine design department as a

whole, especially with respect to its contacts with the product engineers and the machine shop, depends on the design engineers. They make the necessary contacts with the product engineers to determine what is wanted, making recommendations as to the type of equipment needed and the method of attack on the problem. They supervise the making of the preliminary layouts, and collect the necessary information as to existing methods and machinery. It is also their job to collect information on auxiliary equipment available, materials, construction methods, and to whip the entire project into reasonably definite form before the designer begins.

During the progress of the design, they also keep in close touch with the work. Any questions as to space, special conditions, or similar questions raised by the designer should be answered by the design engineer. In addition, he should make available purchasing information on special equipment or material at the earliest possible moment, in order to reduce delays due to long deliveries on special items.

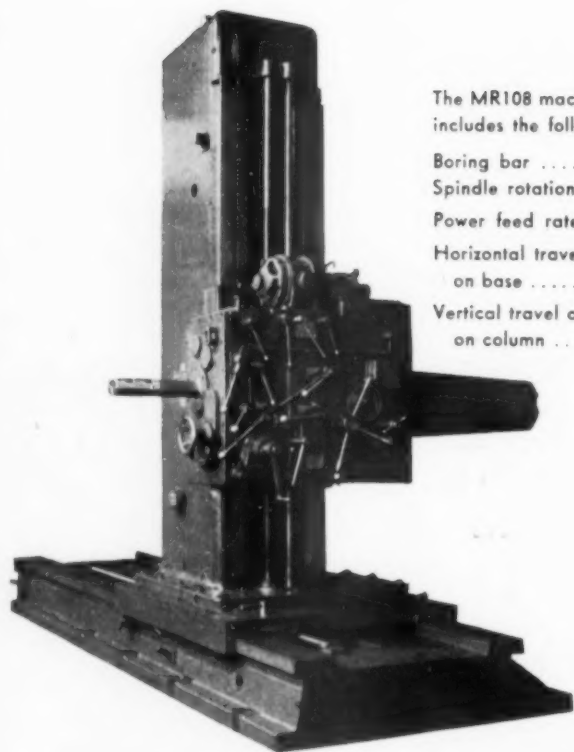
After the drawings are completed, the design engineer should maintain contact with the job in the shop and decide any questions raised during the construction of the equipment. He also decides what changes should be incorporated in the drawings and sees that a record is made of such changes and turned over to the chief draftsman.

The design engineer is also of great value in improving machinery methods and reducing the cost of construction. Since machinery is his specialty, he is well able to judge the value of proposed new machinery methods and equipment. When preliminary estimates of cost indicate that any part is too expensive, he should consider whether the design can be modified or if some special machinery method can be provided to reduce the cost.

Costs of completed jobs should be reviewed by the designing engineer and compared with the preliminary estimates. This check-up will indicate where improvements are needed in shop practice. The cost of the jobs should be filed by the department clerk as they are of great value in estimating the costs of future jobs.

DEVELOPED FOR

War Production!



The MR108 machine, as illustrated, includes the following:

Boring bar 4-inch diameter
Spindle rotational speeds 24
Power feed rates 12
Horizontal travel of column
on base 12 feet
Vertical travel of spindle
on column 6 feet 6 inches

This horizontal drilling and boring machine is only one example of what machine tool builders all over the United States are doing to help industry produce the equipment required by our armed forces.

MOLINE TOOL COMPANY

"Holehog" Moline, Illinois

Established 1901



Helpful "Staff Work"

IN THE BATTLE OF PRODUCTION

All over America, engineers and production men are converting plants to war needs. These men know they can...upon request... get helpful suggestions from us about ways to speed up the working of metals and alloys.

This helpful information has been mobilized into convenient charts, pamphlets and other printed pieces. These tools-in-type range from technical data for engineers to simplified reports on performance of alloys containing Nickel under specific operating conditions.

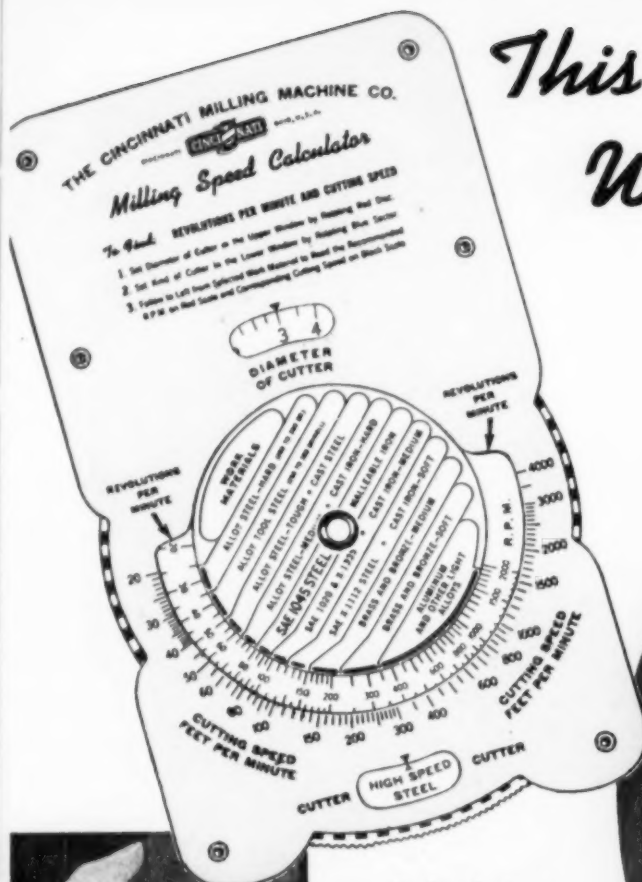
Here, also, are correlated latest reports from the field about selection, fabrication and uses of ferrous and non-ferrous Nickel Alloys.

And, as further support for your battle of production, we offer personal assistance from members of our technical staff. With recent experience in many plants facing materials difficulties, these men become especially helpful. During wartime, Nickel...and information about Nickel...must go where it best serves the United Nations.

☆☆ *Nickel*

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET
NEW YORK, N. Y.

This Calculator Will Help You



**Calculator
and
Instruction
Book
50 CENTS**



There's nothing more discouraging to production men than to see a set of expensive cutters broken while in use, or to hear that a machine has been shut down because of mechanical or motor failure induced by overload. Many of these delays can be eliminated by merely using the right feed and cutter speed.

In milling, these two fundamentals of production can be selected quickly with the CINCINNATI Milling Speed and Feed Calculator. Then too, it's just as valuable at the other extreme of production, wherein machines and cutters are run over-cautiously slow.

The Calculator is a natural outgrowth of our efforts to build milling machines which are easy for the average man to operate, to make him feel sure of the accuracy and finish he can obtain. Consider the CINCINNATI Nos. 2-18 and 2-24 Millers, for example . . . automatic spindle stop; single lever cutting cycle control; safety cutout switches at gear change stations. Complete specifications may be obtained by writing for catalog M-965 (for the Plain Automatic Machines) or M-909 (for the Automatic Rise and Fall Machines)



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Please send me one Milling Speed and Feed Calculator. Enclosed you will find 50 cents in coin.

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TOOL ROOM AND MANUFACTURING MILLING MACHINES... SURFACE BROACHING MACHINES... DIE SINKING MACHINES

PRODUCTION PERSPECTIVES...

News Review of Mass Manufacturing



Trends

LIKE a bronc at a rodeo, the machine tool production curve has reared so sharply within two years that some observers might wonder if it will fall on its back. But some of the best riders in the circuit are in charge of this industry, and there isn't any danger of that. Few authorities, however, predict very exactly where the climb will take the industry.

Noting that 1940 machine tool production more than doubled that of 1939, and that 1941 production was three and one-half times that of '39, 1942 production "bids fair to be many times that of 1939," according to George H. Johnson, president of the Machine Tool Builders' Association. Some idea of how many times is "many" is indicated in the WPB's announcement that "production of metal working machinery has reached a rate of approximately \$1,300,000,000 a year, and is steadily on the increase." This going rate represents an increase of 55% over last year. March shipments of new machine tools, presses and other metal working machinery totalled \$108,600,000—a 73% increase over March of last year.

Small wonder that Mr. Nelson's enthusiasm was stimulated to the point where he declared "we are over the hump." Of course, it all depends on what you happen to consider the hump. Nelson's explanation, following sharp cries of wonder from manufacturers who were being scolded for slow-

ness, was that we are just beginning to produce. And there's no doubt but that getting into production was the biggest hump that ever faced this country.

Over the Hump?

Frank V. Geier, president of Cincinnati Milling Machine Company views a hump more distant. He states that tool manufacturers in his community relate the obstacle directly to military progress. Until we are secure in the face of possible military defeats, that is until we have a backlog of war materiel sufficient to take back strategic points that we may lose, the tool industry is still confronted with a potentially "impossible" task. This matter of impossibility is a relative qualification placed on the job. It's the adjective most frequently used to describe the job that's been done for the last two years. It means, roughly, to do a lot of things you've never done before, without taking time to find out that they "can't be done."

Of course, a factor that has contributed largely to approaching closer to or going over the hump, however you may want to look at it, is the conversion of old tools. There's still a lot of tools, however, that are not at full production. Some of the difficulties are getting men to operate them.

In small shops, there seems to be some concern over cost. Apparently the flow of material is not sufficient to allow extra

"GREENIE"—Adds the home touch--



shift production — even if men were available to operate the machines—and price agreements are not high enough to cover overtime with the crews that are employed. This may not be a general difficulty. It sounds more as though the shop operators had not made all the investigation necessary to solving the problem. Of course, in many an alley shop, the boss is operating a machine himself, and any time he spends investigating is down-time on his machine.

If Canada is setting precedents for us—and they have for price ceilings—idle machinery may be due for confiscation. Rumors have crossed the border to the effect that equipment not in use for at least 16 hours a day will be placed in plants that will put it to use.

Trendcasting can lead to all sorts of if's, and's and but's. Unfortunately, the entire gamut of possibilities and reasons why exceeds space limitations. Presenting some facts and some slight comment, leaves the job of figuring the

trend to the reader. But at least he will come out with something that suits him, and most probably fits into the picture in his section of this big country of ours. Noting the optimism of travelers returned from New England, you might, like the girl in The Tool Engineer's front office, ask, "do you suppose we will win the war today?" But many times New England and the East Coast in general have set the tempo for the country's mood. That doesn't mean necessarily that New Englanders are smarter or thinking way ahead of everybody else—it's just that they live closer to each other—and word of mouth is a fast means of communication down there. The thing to watch is that you're not passing around word out of Hitler's mouth — propaganda to encourage optimism to the point that we relax our efforts.

End of the War

Of course the rumors that pass around more than any others concern when the war is going to end. Actually, they should have no bearing on how hard we work, to end it. And by and large, they do not. Probably most of these rumors start as an estimate of how long we will go before we will get a good night's sleep. But, out of all the estimates, somebody will be right—and get a lot of credit for it.

Detroit Tongue Lashed

After the automobile industry came in for a blast of criticism from the president of a large aircraft manufacturer in the middle west — charges were spending time making costly dies that will have to be thrown away because of changing design, resulting in actual failure to deliver parts for assembly—the motor capital lashed back with facts and figures. For the record, they are a tribute to Tool Engineering. Three big motor manufacturers have pointed to production ahead of schedule. One claimed that production had to be slowed until aircraft assembly plants could catch up. Compared to an auto manufacturer's expense of \$4,000 dies on one job, the plane manufacturer claimed that his cost would be around \$40. The argument probably will not be settled immediately. Somebody will prove somebody else is wrong. But the important point will be that this war is teaching a lot of production lessons. The airplane builders have already learned from the automobile boys, and of course it had to work the other way for the Detroiters to even get going. The TOOL ENGINEER found, when it picked

PRECISION *Scraped* SURFACE PLATES

*from the giant size, 6 x 14 ft.,
to the small fellows, 10 x 15 in.*

From the center to the very edge, every inch of the surface exemplifies precision—in every size of surface plate—from the 10 x 15 in. size to the gigantic size of 6 x 14 ft.

Designed for accurate and dependable inspections. These plates show no distortion, and resist deflection under reasonable load.

Distinctive form of ribbing supported by specially constructed standard, equipped with unique vibration-proof adjusters, assures you of surface plates that maintain a constant level.

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Essentials FOR THE WAR EFFORT

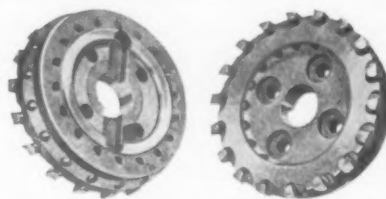
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LOVEJOY MILLING CUTTERS *with positive-locking blades*

Lovejoy mills are designed to withstand the abuse of your 24-hour production schedule. Yet they require minimum power for coarse feeds and high speeds — a minimum of downtime for sharpening — a minimum of blade waste at each resharpening. Maximum use is assured from each blade because of Lovejoy's positive-locking device — maximum accuracy and economy result.

BY MAILING THIS TODAY

Please send me my copy of your 24-page catalog No. 26 describing Lovejoy Milling Cutters in complete detail. (No obligation, of course.)

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LOVEJOY TOOL CO., INC., SPRINGFIELD, VERMONT, U.S.A.

up the story on Willow Run (April, 1942), that Mr. Ford had cut corners amazingly in some of his casting and die-work. As one aircraft engineer said "That's swell, but this is a — of a time to find it out."

Lessons for Peace

This month's editorial subject ties in with the idea that Tool Engineers will build for peace with the production lessons they have learned in this war.

With steel production dependent on scrap supply to keep it at capacity—notably because not enough raw ore to go around can be hauled down from Lake Superior, it is encouraging to note that iron ore shipments by May 1 reached a new all-time high. More than 8,500,000 gross ton—23.9% increase over '41—were "clammed" out of the cavernous holds of the Great Lakes ore fleet. "More ships in shorter time" is the call for saltwater. That sort of call has been

heeded in freshwater shipyards — and ships to haul more ore are coming off the ways now. But, the lake men are also heeding closely to the order to make the most of what they already have. The ore increase is not caused by new boats — there haven't been any for several years. They are getting more out of the bottoms they have—many are 40 years old. One yard took an old tub that leaked like a sieve, right through her rivet holes. They plugged the holes by welding the rivets to the shell. And that ties in with a remark in a letter THE TOOL ENGINEER received from J. P. Lincoln, President of The Lincoln Electric Company. "Man-hours alone will never beat the Axis . . . The efficiency possible by the application of industrial genius will."

Old Machine-Tool Gray

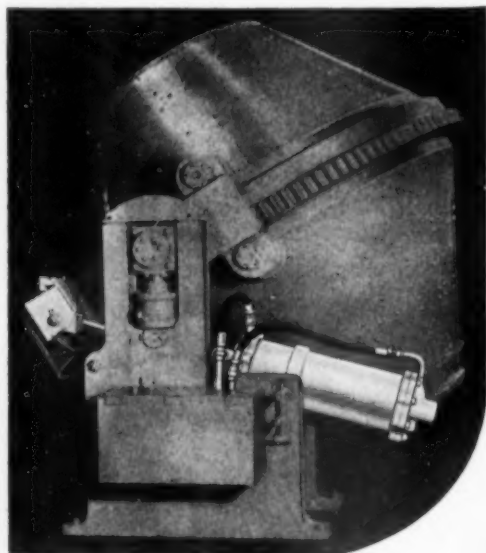
Fancy painting and finishing of metal-working machinery has been banned. Only one coat of primer or sealer may be applied to new equipment. No filler is allowed, and not more than two coats of paint, enamel or lacquer may be used. Even color is restricted. To paraphrase one of the leading auto manufacturers who thus regarded color on his early models, you can use any color, just so long as it is "old-machine-tool gray."

Inspection

Showing the trend toward decreasing production steps, this month's issue carries the story on the Centerscope, a device employing "optics," which goes a long way toward inspecting the job before it is done. This is known as positive inspection in that it relieves material and labor waste by checking the work piece and the machine before the operation.

But there are still the problems of inspection by checking parts as they come off the line, and the war has multiplied them tremendously. With most goods double-checked — first by the manufacturer and then by the Government, a definite relationship has had to be set up between inspection systems. How manufacturers gages must be set within the tolerance in the gages themselves, was told interestingly by Captain A. R. Burgess of the Army Ordnance Department at the St. Louis Convention of the American Society of Tool Engineers. Captain Burgess' talk will appear in the July issue of THE TOOL ENGINEER.

In addition to increased inspection problems, the actual testing of materials and products before they are



New T. L. Smith 56-S Tilting Mixer equipped with NOPAK Model F Heavy Duty Air Cylinder with Trunnion Mounting to provide oscillating movement.

This application of NOPAK Heavy Duty Air Cylinders illustrates their ready adaptability to a wide range of power movements. In this case low-pressure air power is used to tilt heavily laden concrete-mixer drums every 1½ to 2 minutes, hour after hour and day after day.

Built-in, self-regulating air cushions, in the cylinder heads, cushion the tilting action, eliminate shock and vibration. The result is smooth, speedy performance, high production, freedom from maintenance, a prolonged life of strenuous heavy duty service for the tilting mechanism.

Certainly, cylinders which meet the high T. L. Smith standards of design, construction, efficiency and long-lived dependability are worthy of your consideration. Write for Bulletin 82-A.

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2757 South 31st Street Milwaukee, Wisconsin

Every 2 Minutes
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NOPAK
Heavy Duty
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GIANT SMITH
Mixer Drums



NOPAK Air and Hydraulic Cylinders are available with either Adjustable or Self-Regulating Cushion heads in 6 Standard Mountings, in Regular or Heavy Duty Types.

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● Utilizing the revolutionary principle of planetary milling, Plan-O-Mill threads and forms with exceptional speed, accuracy, and finish.

All motion is in the milling head. The part remains stationary. Large, cumbersome pieces and small items are handled with equal ease. No special skill is necessary.

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- ☐ Gun Cradle
- ☐ Gun Body
- ☐ Gun Barrel
- ☐ Cannon Tube
- ☐ Tank Rotor

FORMING

- ☐ Oil Groove in Connecting Rod
- ☐ Shrink Diameter of Cylinder Head

EXTRA!

**PLAN-O-MILL No. 3
NOW THY-MO-TROL
EQUIPPED!**

Thy-Mo-Trol, developed by General Electric Engineers, converts a-c into controlled d-c. Gives infinite range of feeds for maximum production, finish, and cutter life. Reduces time of return on the biggest job to 15 seconds or less!

even put into production—to see if they can do the job required—has been an added problem for many plants. An idea of the increase in this type of work is indicated in the production figures released by the Baldwin Southwark division of the Baldwin Locomotive Works. They delivered 88 standard universal machines in the first four months of 1942—a 57% increase over that period in 1941. An idea of how great this increase really is may be gained from

their statement of entire production in 1939—65 machines.

More Conversion

In April, Donald M. Nelson announced that facilities of American civilian industry which might be used to break war production bottlenecks would be made available. Latest industries to come under this edict are the domestic cooking appliances industry, and the air conditioning industry. In

the first case, large producers must cease production by July 31. Small manufacturers will continue to supply civilian needs, unless they are located in any of 39 labor shortage areas in 15 states. Any firm in these areas must discontinue production of stoves—either going directly into war production or releasing its labor for plants in war production. Both commercial refrigeration and air conditioning are to confine their efforts to essential civilian production and to supplying war demands.

Labor conversion has been small potatoes to date. According to the Chamber of Commerce of the United States, 10,500,000 skilled and semi-skilled workers will be needed in war production this year.

Cheering Section

A big step toward making this change-over in people will not come through selecting individuals and telling them that they are going to work in a war plant—whether they want to or not. It will come through getting popular opinion whooped up over the idea so that when individuals are selected, the best chances are that they have been expecting it, and, by golly, maybe there's something interesting in the job. They will want to take a whack at it. Those that don't go will make up the cheering section.

The educational films that are making the rounds of the neighborhood theatres are building up this cheering section. One of them, "There's a Job to be Done," has had its premier showing in Pittsburgh, suitably enough, for it depicts the vital role of alloy steels in the war. Production of the picture was undertaken by Allegheny Ludlum Steel Corporation. Beginning with a message to Americans by Donald M. Nelson, the film moves into the various phases of alloy steel-making, and then shifts to the way these products are used in ships, guns, shells, planes and tanks. For Tool Engineers who have been too close to the job to know the results of their efforts, such a film could offer stimulation.

Actual conversion of tools still brings us to our feet to applaud the continual display of imagination and genius in unearthing unused equipment that can be put to entirely new kinds of jobs. Latest example to come to our attention concerns the discovery of huge planers, used by the Indiana Limestone company to cut 15,000 pound blocks of stone. They have fitted exactly into an aircraft job — machining large metal plates for experimental work.

TANNEWITZ DI-SAWS



Do in MINUTES jobs which otherwise require HOURS!



Conservatively estimated TANNEWITZ DI-SAWS save an average of 70% of the time and cost involved in making inside and outside cuts on dies, shoes, templates and the hundreds

of other operations, including filing and polishing, to which these machines are ideally adaptable. In many instances they are turning out work in as little as ONE-TENTH of the former time required.

To expedite production and cut costs, by all means investigate the tremendous possibilities these machines offer in tool and die making and other applications.

SAWING SPEEDS PER MINUTE

THICKNESS	CAST IRON	COLD ROLLED	TOOL STEEL	HI SPEED STEEL	HI CHROME HI CARBON
1/4"	16"	9"	5"	23/8"	1 1/2"
1/2"	8"	4 1/2"	2 1/2"	1 1/8"	3/4"
1"	3 1/2"	2 1/4"	1 1/4"	1/2"	3/8"
1 1/2"	2"	1"	3/8"	5/16"	3/16"
3"	1"	1/2"	5/16"	5/32"	3/32"
6"	1/2"	1/4"	5/32"	5/64"	1/32"

The popularity of DI-SAWING is growing by leaps and bounds. Get the complete facts on the most highly developed DI-SAW on the market. Simply write for our DI-SAW Bulletin.

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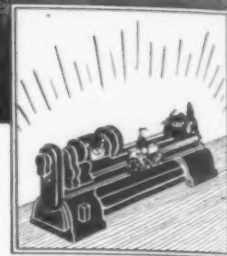


MORE COUNTERBORES TO *BORE-IN ON THE JAPS!*

55 days from pasture to production—Our new Ferndale Standard Cutter Plant is producing counterbores on a 24-hour war time schedule in an all-out effort to help tool America's plane, tank, vehicle and gun manufacturers.

ECLIPSE COUNTERBORE COMPANY
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NEW EQUIPMENT, Materials, Processing



SAV-WAY INTERNAL GRINDER (G78)

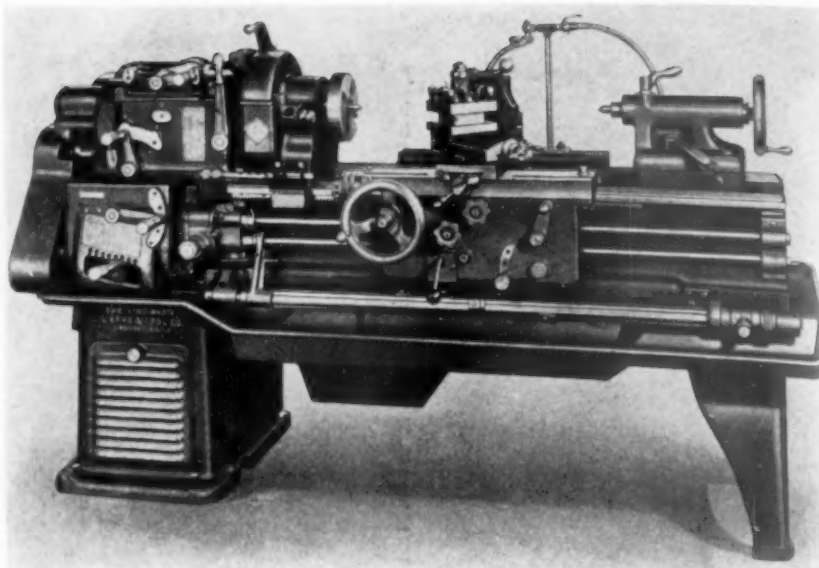
This precision grinder will grind holes up to 9 inches deep and from 1/4 inch to 18 inches in diameter, with straight or tapered sides. It has just been announced by the Sav-Way Tool and Machining Company, Detroit, Michigan.

The construction of the headstock permits an adjustment to a distance of 3 1/2 inches at right angles to the wheel traverse. The headstock traverse is 6 inches and the swing is 18 inches.

The grinding wheel may be adjusted to .0001. The diamond holder is of the swing type with micrometer adjustment. This machine is equipped with an automatic wheel guard.

CINCINNATI GEARED HEAD LATHE (G79)

The latest Cincinnati geared head maxi-production lathe, made by the Cincinnati Lathe and Tool Company,



Cincinnati Geared Head Lathe
Has 32 changes of thread and feed.

Disney Boulevard, Oakley, Cincinnati, Ohio, has 32 changes of thread and feed and 12 spindle speeds.

However, they are so arranged that 64 additional changes of thread and feed and 12 more spindle speeds can be secured.

These lathes are supplied in the 14, 16, 18, 20, 22, 24, 27, and 30 inch sizes and in 2 foot lengths of bed from 6 foot and up.

One of the features of this lathe is the multiple length automatic feed stop. It is fully equipped with six adjustable length stops automatically indexed by a trip lever mounted in the apron.

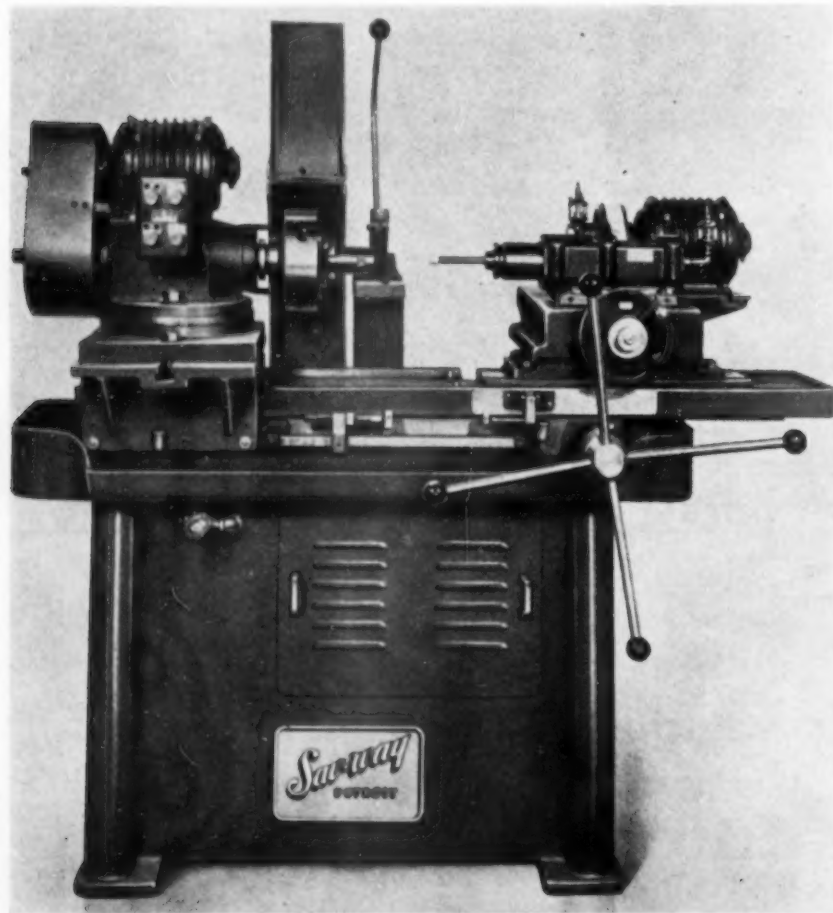
Another feature is the multiple position carriage stop. When used with a spacing rod, it provides as many settings as may be required.

MURCHEY THREAD MILLING MACHINE (G80)

A thread milling machine designed for mass production of left or right-hand internal or external threads from 4 to 12 inches in diameter and up to 3 inches in length has been introduced by the Murchey Machine and Tool Company, Detroit, Michigan.

This operation is done by means of annular milling cutters which cover the full length of the thread. A completely automatic cycle does the threading operation, it just being necessary to chuck the work and start the machine.

THE TOOL ENGINEER



Sav-Way Internal Grinder
Grinding wheel may be adjusted to .0001.

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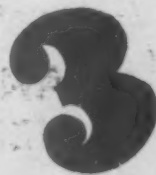
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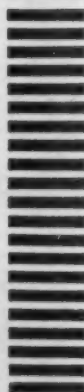
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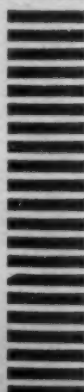
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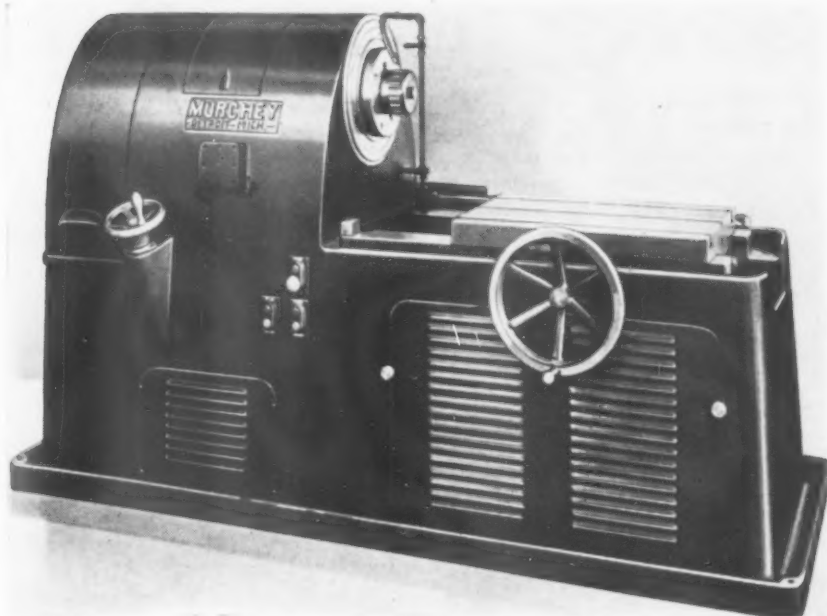
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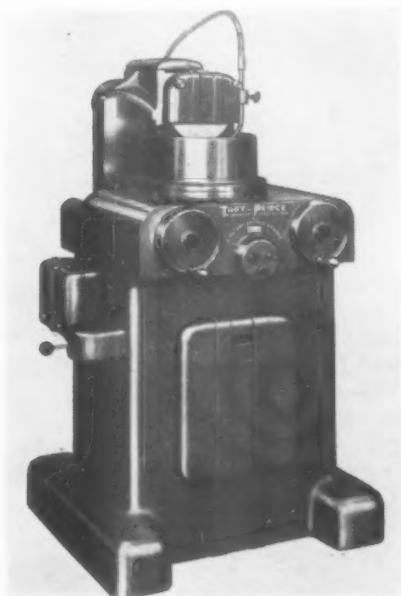
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TO CALL**



Murchey Thread Milling Machine
Annular milling cutters cover full length of thread.

While the work is held stationary, the cutter, rotating on its own axis, is simultaneously revolved eccentrically about the work or piece to be threaded.

Known as the No. 2, this machine takes a floor space 37½ inches by 100 inches.



Taft-Peirce Grinder
Has tilting wheelhead.

6 INCH ROTARY SURFACE GRINDER (G81)

Said to incorporate new and different principles in rotary surface grinder design, a new machine has been recently introduced by the Taft-Peirce Manufacturing Company, Woonsocket, R. I.

This grinder has a tilting wheelhead which makes the machine suitable for

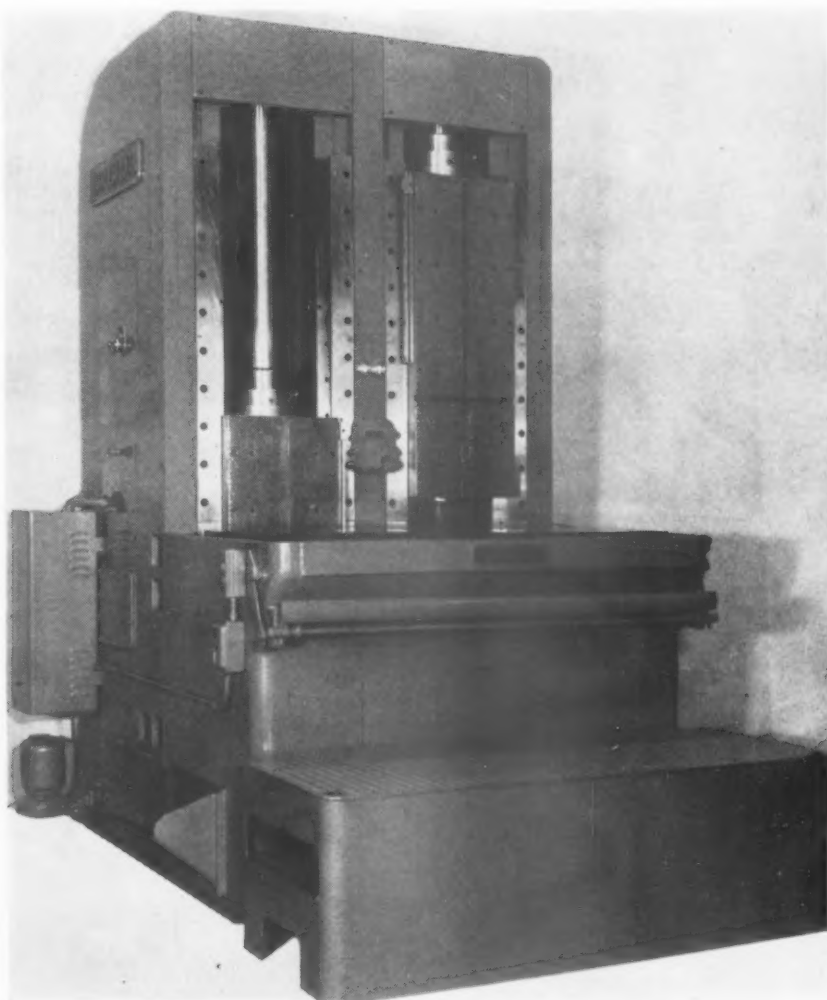
difficult shoulder work. It is claimed that long life is assured from this machine because of the hardened and ground ways and the ball-bearing travel of saddle and column.

The wheel spindle swivels in a vertical plane about the center of the wheel. The spindle is carried in a cast-iron block mounted between two pairs of circular dovetail slides, permitting swiveling of the entire spindle about the wheel center through an arc from horizontal to 30 deg. below center. A simple adjustment of the spindle block is said to make possible operations which formerly required set-ups of tools.

DUAL-RAM BROACHING MACHINE (G82)

Featuring 11 sizes ranging from 3 tons and 36 inch stroke up to 25 tons and 66 inch stroke, a new line of dual-ram broaching machines has been announced by the Colonial Broach Company, Detroit, Michigan.

These machines are said to be especially suitable where high production is necessary and where one operator can



Colonial Dual-Ram Broaching Machine
Main drive motor vertically mounted within machine.

handle the feeding and removing of a part from one ram while the other is on the down stroke.

Column widths of the new dual-ram machines are greater than in former types. Another feature is the vertical mounting of the main drive motor within the machine.

Greater safety for the operator is obtained through the dual safety control and an emergency knee bar. All machines are equipped with heavy-duty, large volume coolant pumps.

Operation of the rams is continuous with one ram traveling down while the

other is returning to a starting position.

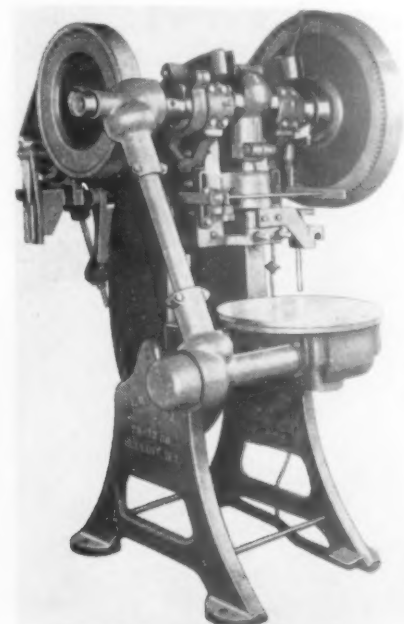
MULTIPLE DIAL FEED PRESS

(G83)

High speed with accuracy and safety through positive indexing and locking mechanism of the dial feed is said to be a feature of the new Federal multiple dial feed press just announced by the Federal Press Company, Elkhart, Indiana.

All moving parts in the dial feed are enclosed with the exception of the dial plate itself. The indexing is obtained

by a cam and gear arrangement in connection with the crankshaft. This specially developed cam is said to smooth out the indexing motion to facilitate speed.



Federal Press
Eight sizes available.

Dial feeds are available on eight sizes of Federal presses, from 6 to 80 ton capacities. The dial plates on the Nos. 0, 1, and 2 have 10 stations. On the Nos. 3, 4, 5, 6, and 7 they have 12 stations.

AIR CHUCK

(G84)

An example of the work done by the Airgrip chucks manufactured by the Anker-Holth Manufacturing Company, Chicago, Ill., is the machining of forged steel flasks, 21 inches in diameter and walls only $\frac{3}{8}$ of an inch thick, to 0.010 inch tolerance on the outside diameter.

This chuck weighs 464 pounds. The 24 inch locator is mounted on a 15 inch,



Airgrip Chuck
Weights 464 pounds.

THE TOOL ENGINEER

Commutator Shell

IT'S MADE OUT OF
SPEED CASE STEEL
A LOW CARBON OPEN HEARTH PRODUCT

—because . . .

It increased production 25%

It increased tool life 33%

It saved \$20.04 per ton of steel used

It swaged without fracture



Ductility
Plus
Machinability
(230 SFPM)

In this "all-out" war effort Monarch Steel is co-operating 100%.
We're helping to "keep 'em rolling" with Speed Case Steel.

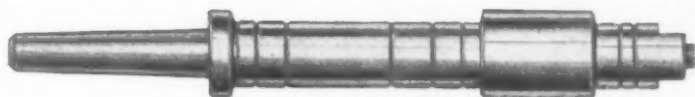
Licensed for Eastern States
THE FITZSIMONS COMPANY
YOUNGSTOWN, OHIO

Licensed
MONARCH STEEL COMPANY
HAMMOND • INDIANAPOLIS • CHICAGO
PECKOVER'S LTD., Toronto, Canadian Distributor

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

QUALITY MILLING MACHINE

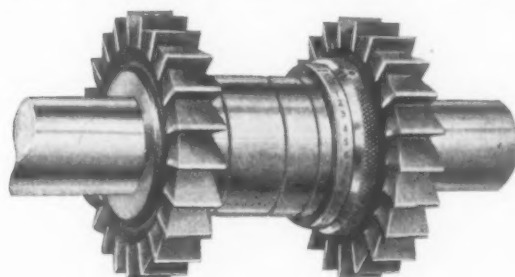
ARBORS



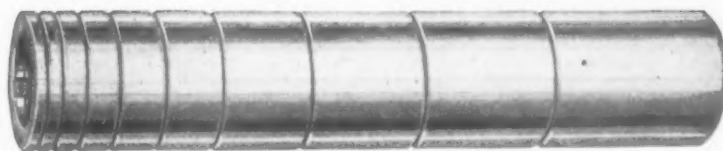
**FOR ALL MAKES
OF MACHINES**

ADJUSTABLE SPACING COLLARS

— THEY ELIMINATE THE USE OF SHIMS —



Solid Spacing Collars



SCULLY-JONES & COMPANY

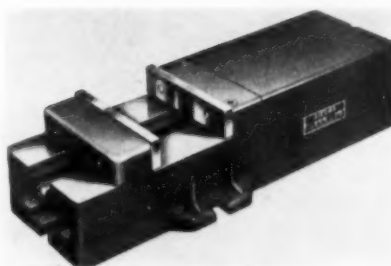
1901 South Rockwell St. .:. .:. Chicago, Illinois

3 jaw, universal chuck. The jaws have a 1 inch stroke, and they expand 1 inch in the flask.

A special feature of this chuck is said to be the matched false jaws that are balanced to within $\frac{1}{4}$ oz.

AIRLOX PNEUMATIC VISE (G85)

The new Airlox Senior Pneumatic Vise, introduced by Production Devices Incorporated, 1169 Main Street, East Hartford, Conn., is so designed and constructed that gripping pressures are



Pneumatic Vise
Greater gripping pressures.

said to be obtainable which exceed those of a similar size screw vise, while

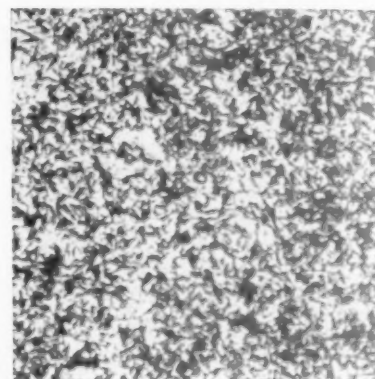
still retaining the speed and adaptability of air.

The vise mechanism is enclosed inside the vise body, thus shielding the moving parts from contact with chips, dirt, and coolants.

TCM HIGH-SPEED STEEL (G86)

Replacing 18-4-1, a new high-speed steel called TCM has just been announced by the Jessop Steel Company, 611 Green Street, Washington, Pa. This is a low tungsten-molybdenum steel and important now with the shortage of strategic alloys.

No change in the operating equipment is necessary in using this new steel because it is heat treated in the same furnaces and the same atmosphere as the 18-4-1 high-speed steel. TCM has a slightly lower hardening temperature which makes the heat treating cost lower. This new steel is also lighter than 18-4-1.



High-Speed Steel
Low in tungsten-molybdenum.

POLISHING WHEELS (G87)

Designed for delicate work in producing special finishes and polishes, the



Finetex Wheel
Is rubber-cushioned.

THE TOOL ENGINEER

Green Help? ...SURE!
**BUT PRODUCING O. K.
THE FIRST WEEK!**



Boice-Crane DRILL PRESSES

MORE PRODUCTION
Right From The Start
from
UNSKILLED WORKERS
AND WOMEN



**SAVE
SPACE**

**TOOL UP
NEW JOBS
QUICKER**

**Available
NOW**

Make inexperienced and female help real producers in a hurry. Hundreds of plants at work on U. S. armament are accomplishing that with these compact, stripped-for-action Boice-Crane Drill Presses. More easily adaptable to special needs and far more flexible in tooling up production. Big production increases are reported on practically every installation. They cost less too, and you can get them RIGHT NOW! Send for CATALOG and the facts!

DRILL PRESSES • TAPPING MACHINES • BAND SAWS • WOODWORKING MACHINES

Write BOICE-CRANE CO., Div. B, TOLEDO, OHIO



The reamers manufactured by Carbide Fabricators are today contributing materially to faster, more efficient War Production. They are made to the accuracy that provides the most uniform results in production reaming. Because they are produced by an organization with many years of experience in working with cemented-carbides, they can be depended upon for lasting wear-resistance. Being sturdy, durable tools, they permit a stepping-up of usual R.P.M.'s in reaming operations.

Carbide Fabricators cemented-carbide tipped reamers are supplied in both expansion and solid types. A complete catalog outlines the various exclusive features of each type and lists prices for the entire line. Write for your copy.

NEW FACILITIES FOR CARBIDE FABRICATORS

Construction is now in progress of a new, modern Carbide Fabricators plant. With the additional facilities which it will offer, a much greater production volume of cemented-carbide tipped tools will be possible.

Up until recently, we have been able to maintain 24 to 48-hour delivery service on almost all standard lines. The completion of this new plant—and the securing of additional equipment—will aid immeasurably in re-establishing our usual prompt delivery schedules.



Carbide Fabricators

BERKLEY
MICHIGAN

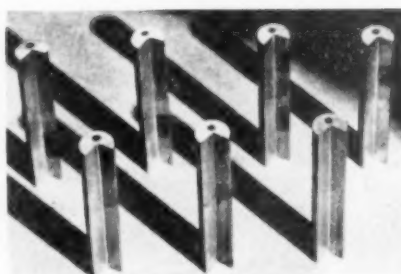
DIVISION OF MORSE TOOL COMPANY • DETROIT

Brightboy Finetex wheel has just been announced by the Weldon Roberts Rubber Company, Newark, N. J.

This addition to a line of rubber-cushioned abrasive products is a finer texture wheel. The Finetex small wheels are made in sizes from 1/2 to 1 inch in diameter. The larger wheels are available in diameters from 1 1/2 to 5 inches.

GUN DRILLS (G88)

Carboloy tipped rifle drills for 30 and 50 caliber and 20 mm. gun barrels have



Rifle Drills
Tip brazed to steel shank.

been placed into production by the Carboloy Company, Inc., Detroit, Michigan.

These new gun drills are to be furnished with the Carboloy tip brazed to a short steel shank which in turn is attached by the users to their regular gun drill tubes. Through experience cutting edges are not finish ground but ground by the individual user.

The new drills are designed so that they may be placed in production without requiring other changes in equipment with the exception of feeds and speeds.

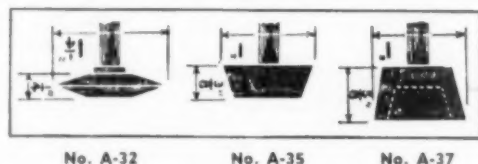
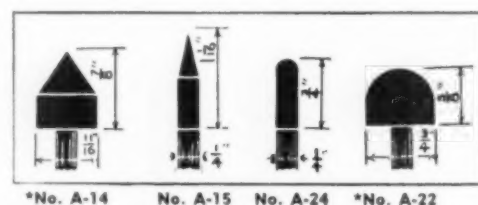
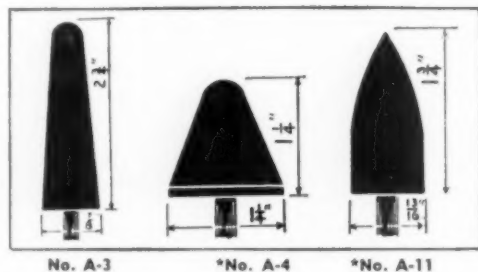
GRINDING THE WAY TO VICTORY

CHICAGO MOUNTED WHEELS

● Speed and Smoothness in cutting action—Longer Life—that's what you get when you use Chicago Mounted Wheels.

Made in all types of abrasives, grains and grades, mounted on shanks of different diameters and lengths—there is a Chicago Mounted Wheel to lick every grinding job from the most intricate cartridge dies to snagging hard-to-reach parts on tanks. For high-speed POLISHING, the sensational new Chicago Soft Rubber Mounted Wheels save hours of tedious hand work.

Illustrated is a group of wheels mounted on 1/4" diameter shanks, for use with portable and precision equipment. These are one-half actual size. Hundreds of other shapes are available on 3/32", 1/8" and 3/16" diameter mandrels.



*This shape also available in Soft Rubber Polishing Bond

TRY ONE FREE

That's the quick way to learn first-hand about these remarkable wheels. Tell us the kind of job, size and wheel speed you use and we'll send a test wheel postpaid.

CATALOG

Covers the complete line of Chicago Mounted Wheels and time-saving accessories for use with portable tools. Send for copy today.

CHICAGO WHEEL & MFG. CO.

Makers of Quality Products for 40 Years

1101 W. MONROE ST.

DEPT. TE

CHICAGO, ILL.

GRAY COOLANT PUMPS (G89)

Two new larger capacity portable, controlled flow coolant pumps for attachment to drill presses, lathes, grinders, saws, tappers, and milling machines have been announced by the Gray-Mills Company, Inc., 213 West Ontario Street, Chicago, Ill.



Coolant Pump
Controlled flow of coolant.

These new pumps have capacities of 75 and 130 gallons per hour with pressures of 20 and 30 pounds. Among the features claimed of these new models are portability, control of coolant flow, ease of replacement of all wearing parts, and the ability to handle coolants of all but the extreme viscosities.

TOOL ROOM CHILL CHEST (G90)

Said to give assurance of precision and accuracy, a new chill chest to kill growth of precision gauges, season die sets, and improve chill shrink fits, has just been brought out by Revco, Inc., Adrian, Michigan.

Capable of temperatures as low as -75 deg. F., this chill chest is compact and designed for both large and small tool shops.

HAYNES STELLITE MILLING CUTTER BLADES

For High Production at Low Cost

HAYNES STELLITE standard milling cutter blades are carried in stock for immediate delivery. These blades are widely used in the production milling of cast iron parts—because they have long life between grinds, at high speeds and fast feeds. High production is thus obtained at low cost per piece machined.

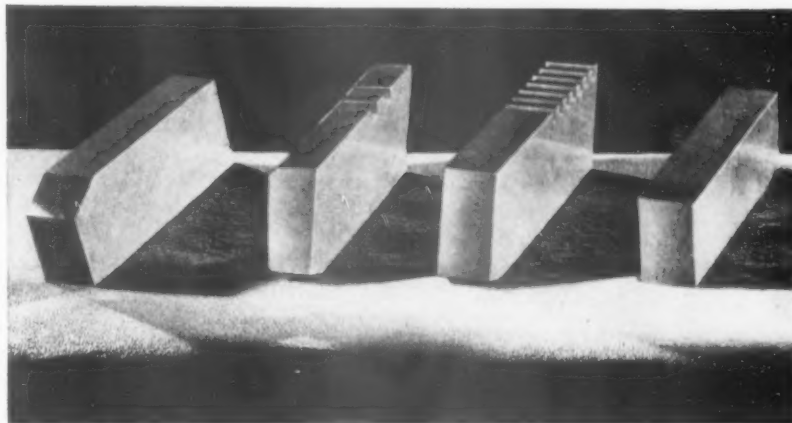
OTHER STANDARD TOOLS

Haynes Stellite standard *tool bits* are also stocked in a variety of sizes for immediate delivery, finish-ground for use in standard tool holders. Since each size can be easily ground to any required profile, tool inventory can be kept at a minimum. A large variety of standard *welded tip tools* is also available for quick delivery. These tools consist of a cutting tip of cast Haynes Stellite alloy welded to a tough steel shank and can be used where use of solid bits is impracticable.

SPECIAL TOOLS ON ORDER

Special tools—including solid bits, welded tip tools, milling cutter blades, brazed-in blade shell end mills, grooving and form tools, boring and reaming blades, spot facers, and counterbores—are supplied to users' specifications.

Consider the advantages of Haynes Stellite tools for the jobs in your shop.



AVAILABLE FOR IMMEDIATE DELIVERY

The Haynes Stellite standard milling cutter blades listed below are available from stock. They are supplied finish-ground with tolerances of plus 0.001 in., minus 0.000 in. on thickness; plus 0.005 in., minus 0.000 in. on width; and plus 1/32 in., minus 0.000 in. on length. For best results, these blades should be used in hardened steel cutter bodies.

STANDARD MILLING CUTTER BLADES					
Type	Thickness in.	Width in.	Length in.	Angle, deg.	Haynes Stellite Blueprint
Ingersoll	0.297	5/8	2 1/2	10	D8818
	0.344	3/4	2 9/16	20	D7143
	0.344	3/4	2 3/4	30	D14965
Kearney & Trecker Right Hand Left Hand	0.344	3/4	2 9/16	18	D13563-Detail 1
	0.344	3/4	2 9/16	18	D13563-Detail 2
Modern	0.312	3/4	2 47/64	15	D6082
	0.375	3/4	2 47/64	15	D6081
Production	0.375	5/8	2 13/16	15	D1806
	0.375	1	2 13/16	15	D1805



Red-hard, wear-resisting alloys of cobalt, chromium and tungsten

HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

New York, N. Y.



Kokomo, Indiana

Chicago—Cleveland—Detroit—Houston—Los Angeles—San Francisco—Tulsa



• HIGH-PRODUCTION METAL-CUTTING TOOLS •

"Haynes Stellite" is a registered trade-mark of Haynes Stellite Company

JUNE, 1942

125



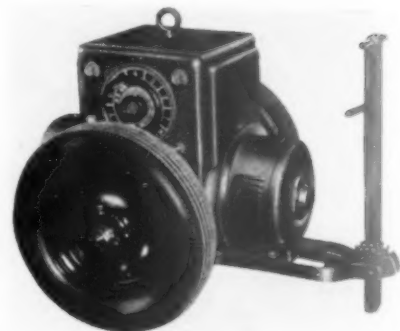
Revco Chill Chest
Sub-zero temperatures.

TRAILER FOR WELDERS

(G91)

Designed for mounting 200, 300, and 400 ampere Hobart electric drive welders, a new two-wheeled, pneumatic-tired trailer is being made at the Hobart Brothers Company, Troy, Ohio.

The trailer is so designed that mounting is accomplished by means of three bolts in the frame of the trailer. Combination tow bar and standing support has a hand-operated ratchet for locking support arm in position.



Welder Trailer
Made for road towing.

Made for road towing up to 35 mph, it can also be easily moved by hand because of its low, underslung construction.

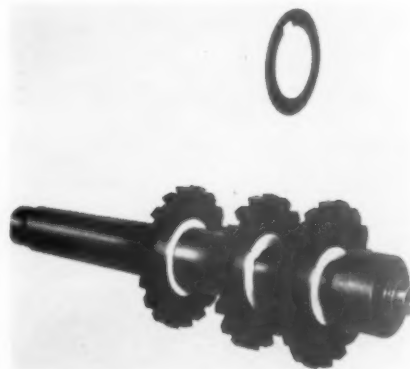
PLASTIC SPACERS

(G92)

A plastic spacer, reported to save brass and steel and to speed up milling machine operations, is being made by the Industrial Products Suppliers, New York City and is called the Artus Spacer.

These spacers are available in 10 thicknesses, each with its own identifying color. They are made in thicknesses from .001 to .020 inches with hole diameters as high as two inches with standard keyways. Larger sizes with outside diameters up to 10 inches may be had on order.

It is claimed that the spacer retains its thickness and evenness under all normal working conditions.



Artus Spacer
Available in 10 thicknesses.

OFFSET RIVET SETS

(G93)

A new line of offset rivet sets designed with angular offsets of 7½, 10, and 15 degrees has just been announced by the Aero Tool Company, Burbank, Cal.

A process known as Micro-glass polishing is used in the manufacture of these rivet sets which is said to develop

THE TOOL ENGINEER

**Yes, WE HAVE HELPED
TO UPSET INDUSTRY**

We have helped to make scores of transitions from normal to war production—devised ways and means of adapting present equipment to the new demands—expedited government orders—introduced new production methods and rearranged plant layouts.

And we're still at it—with our sleeves rolled up—going strong—with a large staff of engineers bending every effort to get this important job done.

Let's keep 'em flying.

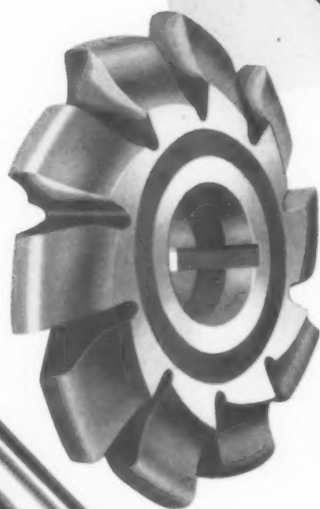
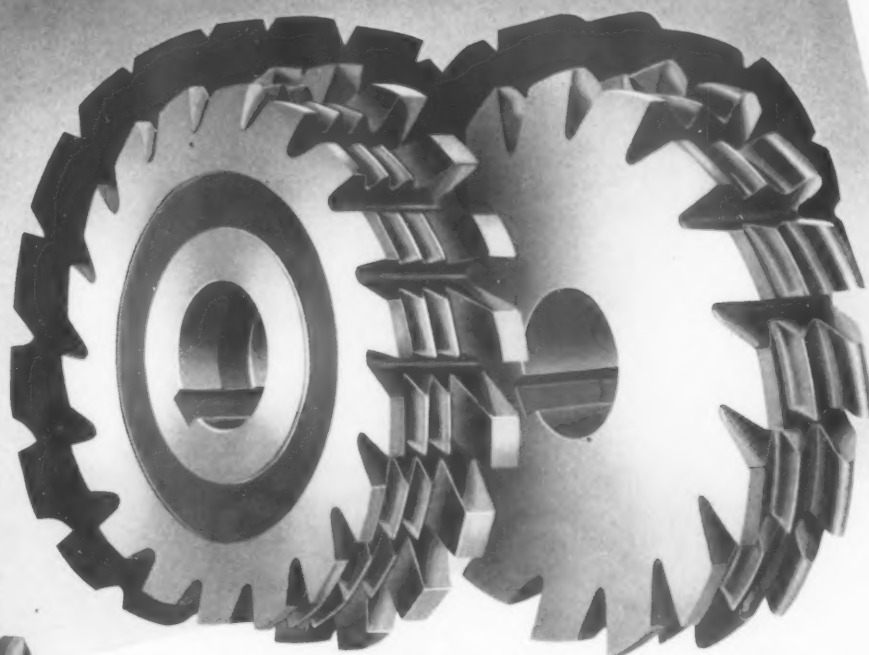
Pioneer

ENGINEERING & MANUFACTURING CO.
19645 JOHN R • DETROIT, MICHIGAN

FORM RELIEVED CUTTERS

are economical when you have to mill intricate shapes and outlines

MIDWEST



WHEN CONSIDERING FORM CUTTERS, NOTE THE FOLLOWING:

There are an infinite number of shapes, both symmetrical and irregular in outline, which can be milled efficiently and economically with Midwest Form Relieved Cutters. These cutters, provided with eccentric relief behind the cutting edges, always maintain the original outline of form when they are sharpened by grinding the faces of the teeth. However, conditions are so varied in the application of form cutters, no definite rules can be offered for making a proper selection as to type and form. When considering form cutters, send a blueprint of part to be milled; outline the cutter on the surface to be milled; furnish all dimensions of the form shown, with tolerances; specify arbor diameter, keyway size, and rotation. On unsymmetrical forms, designate below the outline, rotation, as "bottom going" or "bottom coming." Whenever possible, form cutters should have undercut teeth, the degree depending upon operating conditions. When sharpening a form cutter, the amount of undercut which is marked on the cutter should be preserved, since the form was corrected for this exact amount of rake . . . Other examples of Midwest Form Relieved Cutters may be found in Midwest's catalog 17 of Precision Metal Cutting Tools.

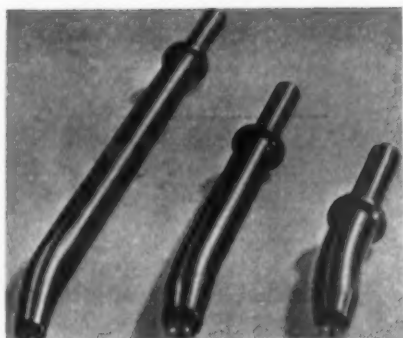
Your Security and Freedom depend on your Country Winning the War. There is no alternative. Your Country needs your Fighting Dollars for Victory. Invest them Now in United States Bonds and Stamps.

END MILLS • SLEEVES • COUNTERBORES • SPECIAL TOOLS • DRILLS
REAMERS • FORM TOOLS • CARBIDE TIPPED TOOLS • ADJUSTABLE HOLDERS

MIDWEST *Precision*

METAL CUTTING TOOLS

MIDWEST TOOL & MFG. CO. • 2364 W. JEFFERSON AVE. • DETROIT, MICHIGAN



Offset Rivet Sets
Have a glass-smooth face.

a glass-smooth face and thus will not harm aircraft skins or other surfaces the tool contacts.

INTERCHANGEABLE DIES (G94)

An interchangeable die for marking aircraft instrument dials has been completed by Wm. A. Force and Company, Inc., Brooklyn, N. Y. It is said that this new die does a precision numbering job on aluminum and locates the markings exactly at the rate of approxi-

mately 240 pieces per hour.

Pilot pins position the work piece radially and concentrically to insure accurate location of the impression. The depth of the impression is controlled by bearer bars.



Interchangeable Die
Marks instrument dials.



● In war production plants everywhere, the DoAll is doing an outstanding grinding job on three counts—speed, smoothness and extreme accuracy.

The above view taken in an Ohio plant shows a production set-up of 50-caliber bullet dies, one of many difficult jobs handled on the DoAll.

Special ultra-modern construction features have minimized vibration, and insure long, satisfactory, high precision service.



WORTH LOOKING INTO

Send for interesting literature about this better grinder.

SAVAGE TOOL CO.

Dept. TE, Savage, Minn.

6 REASONS WHY THIS GRINDER IS THE BEST

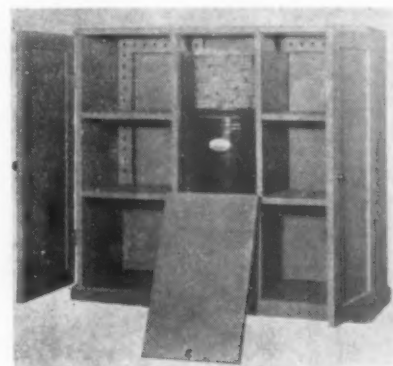


CABINET DE-HUMIDIFIER (G95)

A new cabinet said to protect tools against the effects of excess moisture has just been announced by The General Air Conditioning Corporation, 4426 Appleton Street, Cincinnati, Ohio.

The cabinet is of wood, 34 inches high, 38 inches wide, and 14 inches deep. Dehydrating, chemical cubes absorb the excess moisture from the air.

For use in spaces and buildings where infiltration is at a minimum, Water-Sorber units are also available.



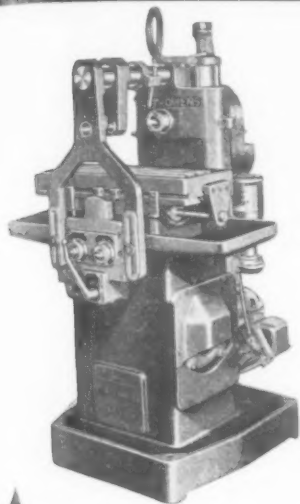
De-humidifier
Protects tools against moisture.

ELECTRIC GRAVER (G96)

The tool room model of the Electric Graver being made by the William Moore Manufacturing Company, 651 South State Street, Chicago, Ill., is equipped with a diamond point and is said to engrave on the hardest of metals.

The complete outfit consists of a reducing transformer which plugs into any 110-120 volt A.C. outlet. The machine is attached to a transformer and the work is not grounded.

This engraving outfit weighs only 10 ounces and has only one moving part, a vibrating spring.



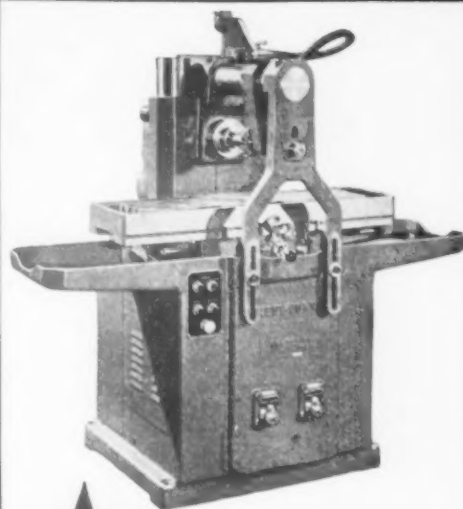
No.
1-8

8" table travel... 25" by 9" table... hydraulic table feed... simple automatic cycle.

Rugged.. Simple.. Efficient

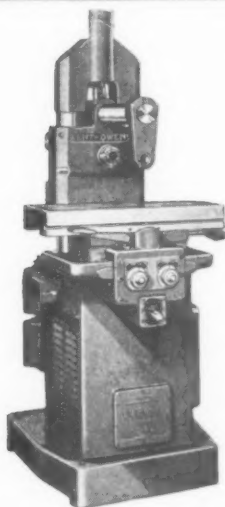
In these days the man at the machine is all-important to faster and better production. That's why Kent-Owens Milling Machines are so popular with shop men everywhere.

You can't go wrong when you pick a Kent-Owens Milling Machine. These *Rugged, Simple, Efficient* Kent-Owens Milling Machines have the practical advantages and features to get jobs out of the tool room and on a production basis... in a *hurry!* No job too tough for Kent-Owens Machines. Send for latest bulletins. Contact your nearest representative or write us direct. Kent-Owens Machine Co., Toledo, O.



No.
2-20

20" table travel... 42" by 12" table... full automatic hydraulic table feed.



No.
1-V

Hydraulic vertical head feed... 5 1/2" head travel... 25" by 9" table.

Call on **KENT-OWENS** for Milling Machines

THERE'S A KENT-OWENS REPRESENTATIVE NEAR YOU

BOSTON
General Machinery Corp.

BUFFALO
Don W. Patterson
CHICAGO
Neff, Kohlbusch & Bissell

DALLAS
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DETROIT
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HOUSTON
Oliver H. Van Horn Co., Inc.

INDIANAPOLIS
Oatis-Booth Machinery Co.
KANSAS CITY
Eichman Machinery Co.

LOS ANGELES
Eccles & Davies Machinery Company
Harron, Richard, & McCone

MILWAUKEE
Neff, Kohlbusch & Bissell

MOLINE
John J. Normoyle Co.
MONTREAL
F. F. Barber Machinery Co.
NEW ORLEANS
Oliver H. Van Horn Co., Inc.

NEW YORK
Wilson Brown Company
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SAN FRANCISCO
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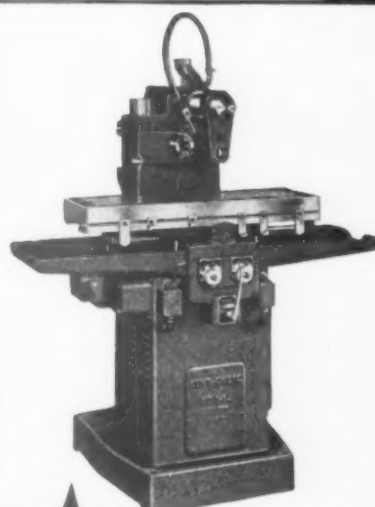
SEATTLE
Star Machinery Company

ST. LOUIS
Blackman & Nuetzel Machinery Company
Clarke Equipment Co.

SYRACUSE
J. F. Owens Machinery Co.

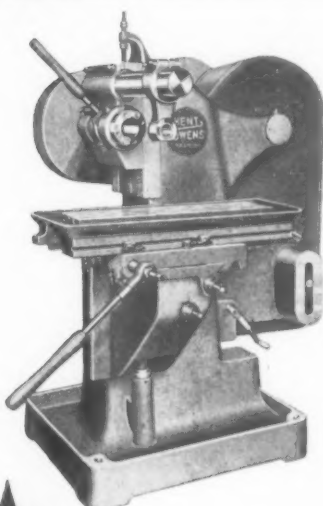
TORONTO
F. F. Barber Machinery Co.

WALKERVILLE
F. F. Barber Machinery Co.



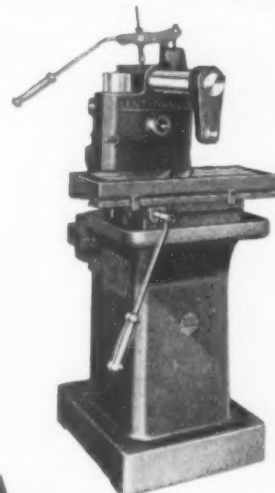
No.
1-14

32" by 9" table... 14" table travel... hydraulic table feed... full automatic cycle.



No.
2-RV

3 H. P. ... hand feed to table and head... spindle speed range 100 to 1200 R. P. M.



No.
1-M

Hand feed to table and head... 25" by 9" table... 1 H. P. ... head counterbalance is adjustable.

TWIST DRILL GRINDING FIXTURE (G97)

A drill grinding fixture that is said to save from one half to three fourths of the time consumed by hand grinding, has just been announced by the Industrial Engineering Company, Inc., 311 Sixth Avenue South, Minneapolis, Minn.

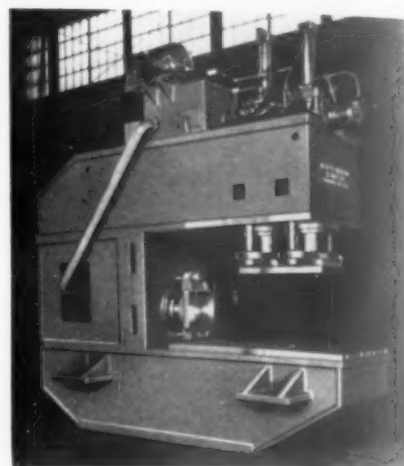
It is claimed that the life of twist drills is doubled by eliminating the errors of hand grinding and more perfect drilling is assured by ending oversize

and off-center holes.

The correct angles and clearances for drilling all hard and soft metals are permanently built into this fixture so that there are no adjustments to make. This fixture will grind any drill from A- 1/4 inch to 27/8 inches.

FORMING AND FLANGING PRESS (G98)

Available in capacities up to 400 ton, an hydraulic forming and flanging press has recently been introduced by the

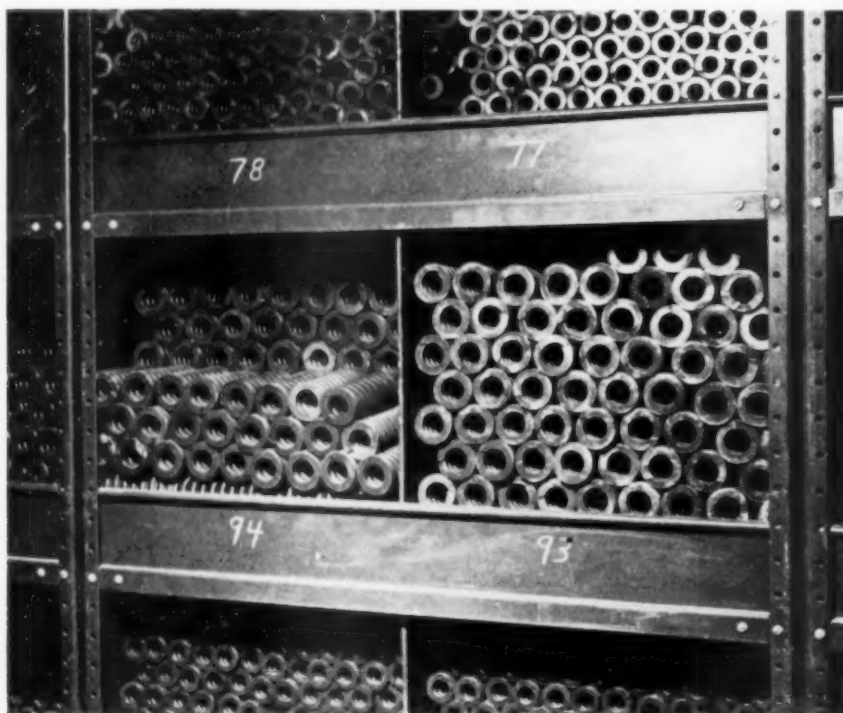


Beatty Press
Has self-cooling oil system.

Beatty Machine and Manufacturing Company, Hammond, Indiana. This press features a self-cooling hydraulic oil system which is said to eliminate the need for cooling coils.

The front cylinder advances to the work on the down-stroke at the rate of 290 inches per minute, when used for flanging. It holds the work under pressure while the horizontal ram advances at the same rate. Under a full load this ram is said to press at the rate of 21 inches per minute. All cylinders are controlled by a manual valve lever.

Among the other features of the 400-ton press are, the 45 inch maximum daylight of press, the 24 inch stroke of cylinder, and the 66 inch depth of throat from center of vertical cylinders to housings.



IMMEDIATE DELIVERY ON MUEHLHAUSEN DIE SPRINGS

FREE! WRITE FOR YOUR COPIES



New Muehlhausen Die Spring Folder Illustrates, Describes and Prices 206 Sizes and Types of Die Springs for High Speed, Regular Speed and Heavy Duty Presses.

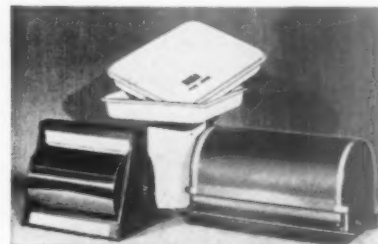
Muehlhausen Spring Corporation
625 Michigan Ave., Logansport, Ind.

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Muehlhausen's complete stock of die springs assures you of fast delivery. There are more than 200 sizes available, ranging from 1 to 15 inches in length and exerting pressures from 80 to 3,000 lbs. All are designed to withstand the rigorous demands of modern die work.



Copying Device
No dark room required.

PHOTO COPYIST (G99)

Said to make perfect copies direct from anything written, printed, or drawn, a copying device is being made by the American Photocopy Equipment Company, Chicago, Ill.

No dark room is required, it is claimed, the article to be copied being placed with a piece of special paper on the operating surface. The contact cover is then closed and the switch pressed, exposing the object for a few seconds. The exposed paper is put in developer and fixer.

NEW CATALOG



64 PAGES

The new comprehensive, heavily illustrated Cincinnati Press Brake Catalog brings you up to date on today's wide application and development of the modern Press Brake.

THE CINCINNATI SHAPER CO.
CINCINNATI, OHIO, U. S. A.

Please send me the new 'B-1' Department TE
Cincinnati Press Brake Catalog.

THE CINCINNATI SHAPER CO.
CINCINNATI, OHIO

Name _____

Company _____

Address _____

Handy Andy Says—



SAT in at a meeting of the Exec. Com'tee May 3rd., at Nat'l H. Q., the occasion being the appointment of various committees for the coming year. Prex Otto Winter presided, having commuted from Chi, and Ray

Morris, come all the way from West Hartford, and Doug Burnside, third in line, but whether he blew in from St. Louis or Washington I can't say, Doug leading a sort of dual existence of late. Local boys Clyde Hause and Frank Crone made it 100% attendance for the Big Five, besides which I saw, Ad Potter, our new Exec. Secy., in action for the first time. (You know, I think the guy will do right well by us, once he gets the feel of things). The upshot of it was that Chapters North, East, West and South were combed for outstanding men, with the final selections a compliment to the appointees and no reflec-

tion on those who also ran. So now, do your stuff; few of us will be called to work as hard as the men on the bridge of the A.S.T.E. ship.



We've had some pretty good men at the helm since the Society was organized, and I think that the present Five will compare favorably with their predecessors. Otto Winter seems to be a member of most of the prominent engineering societies, although, like most polygamists, he centers his affections on a favorite—in this case the A.S.T.E. (No record of A.W.O.L.) Ray Morris is a swell fellow with a background of accomplishment, and the same can be said for Doug Burnside. Leaders just don't win their spurs—and keep 'em—riding gentled nags. Anyway, both of these boys are fine presidential timber, as we'll probably find out in good time. Meanwhile, we'll look forward to a good, progressive year under Otto Winter. He's got the will to do, and rarin' to go.



Me, I left oily a/c having to go to N'Yawk for the foim, and I'll tell you about it (except for the serious business) partly for the benefit of blase Pullman habitues and partly to acquaint the Gothamites with their town. Anyway, why not a travelogue?—I've got to write about something, besides which I always get a kick out of going places. Never can tell what's around the corner. Enroute, stopped off at Buffalo and phoned greetings to Geo. Keller, who in turn relayed his to the boys. Woke up betimes, with Bear Mountain in the offing; and enjoyed the scenery along the Hudson. Sing Sing, grim and grey. At that, a lot of people in Nazi concentration camps would be glad to trade places with the boys in the big cage, what with their good eats, radios and other appurtenances of reform.

Grand Central at last!—first time in twenty-five years. Right away, headed for Child's, a block or so west of the station on 42nd., having had a yen, these many years, to once again see the guy in the window flip flapjacks and coffee cakes. But no! Child's done went and got sophisticated, with a bar where women sit and drink and smoke, and even the buxom waitresses have been replaced with streamlined models. The only thing left of the old Child's was their fresh yard eggs, maybe different from the ones laid in the hay. No matter; I'm allergic to 'em however they're laid. Outside of that, I felt pretty much at home, what with the crush in the subway and all, although a few buildings have gone up in the meanwhile.

Top Notch FOR TOUGH JOBS

Jessop TOP-NOTCH Shock-Resisting Tool Steel



Thread rolling die made from Jessop TOP NOTCH, threaded over 2,000,000 screws made of S.A.E. 1010 steel.

● Die operations, under conditions of constant and severe impact, are more efficient and more economical when dies are made from Jessop Top Notch Shock-Resisting Tool Steel.

Jessop Top Notch is a low chrome, low tungsten alloy steel whose analysis combines characteristics of good wear resistance and extreme toughness. These qualities make Jessop Top Notch adaptable for use in many cold work and semi-hot work applications where resistance to shock is an important factor. It may be either oil hardened or air hardened. Technical data furnished on request—write for free literature.

There is a Jessop steel for every tool and die requirement

JESSOP STEEL COMPANY
General Offices
WASHINGTON, PENNA., U. S. A.



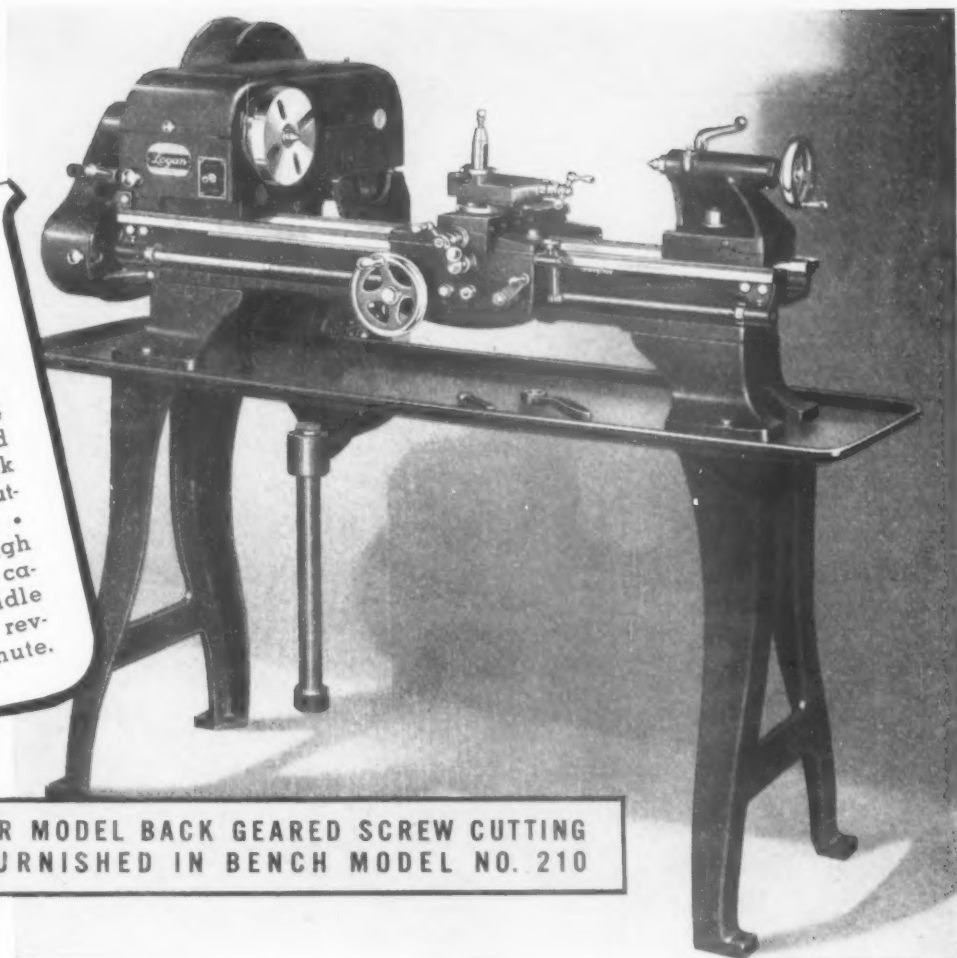
JESSOP STEELS FOR AMERICA AND HER ALLIES

CARBON · HIGH SPEED · SPECIAL ALLOY · STAINLESS · COMPOSITE STEELS



SPECIFICATIONS

10" swing; 24" between centers • Bed 6 15/16" wide by 43 1/8" long • Prismatic V and flat ways, hand scraped and honed • New Departure precision pre-loaded ball bearing headstock spindle • Thread cutting, 4-216 per inch • 25/32" hole through spindle, 1/2" collet capacity • 12 spindle speeds, 30 to 1450 revolutions per minute.



NO. 200 LOGAN FLOOR MODEL BACK GEARED SCREW CUTTING LATHE • ALSO FURNISHED IN BENCH MODEL NO. 210

A Logan Lathe is a "PLUS" Investment

Advanced streamline design and sturdy construction is your first impression of the No. 200 Logan Lathe. Further study presents convincing evidence of higher engineering standards, better workmanship and a wealth of added features — all of which will pay you extra dividends in continuous precision performance and better shop satisfaction.

LOGAN ENGINEERING COMPANY • Chicago, Illinois

Logan A NAME TO REMEMBER
WHEN YOU THINK OF LATHES

Right away, I recognized the Empire State, having seen it before in a movie called King Kong or something, a big gorilla who stood on top of the building and yanked planes out of the sky. He'd be handy right now, to snatch down the monkeys that grow in Nippon.

My business took me over to Boss Hague's domain over in Jersey, where I finally trailed my quarry to Newark. There, by happy thought, it occurred to me to call up Dr. Lawson, Prex of Up-

sala College, with whom I have corresponded some although we'd never met. He invited me to lunch, designating a meeting place. "How'll I know you?" I asked. "Well, I'm big and fat", he said. "And I'm bald and skinny", I described, all of which sufficed for instant recognition. After lunch, he showed me around, and you know, Upsala reminds me of the A.S.T.E.—another fine idea that's just grown and grown. While still a liberal arts institution, with considerable stress on science, Upsala's progressive young president has ar-

ranged a cooperative agreement with Newark College of Engineering, designed to meet the urgent need for engineers in war-time industries. Why not establish a chair in Tool Engineering, Dr. L.? — right now, the sturdiest branch in the field. In war as in peace, the Tool Engineers are the key men of industry.

With reservations, I want to go on record as protesting the proposed 40 mile speed limit, ostensibly designed to conserve gas and rubber. Will it? Over a period of years, I have personally averaged better than 30,000 miles on a set of tires, discarding them when smooth but still serviceable, and the current crop—or what's left of it—is the toughest yet. I usually move along, but find that the *sensed* cruising speed—which may be anywhere from 45 to 65—is the gait at which one gets the best gas mileage. As for tires, cruising speed is easy on rubber, wear being occasioned less by reasonable speed than by careless starting and stopping. However, there are other savings just as important as the conservation of rubber, vital as that item is. As, for example, the saving of man hours in the mass production of war goods. Somehow, we'll manage mass transportation, but there is a skeleton crew of widely experienced and highly trained technical experts that acts in various capacities, but mainly as consultants and trouble men for small shops and even the larger plants converted to war production. In constant demand, these men are as constantly on the go and generally in a hurry. They have to be!—many men may be idle and vital production arrested while waiting for an expert to straighten out a tangle. Laws should be obeyed, but they'll serve their purpose the better if framed on the facts, not on prejudice. Anyway, why not some distinguishing insignia for key contact men? Not as a badge of special privilege, but to distinguish them from non-essential jay drivers. Let our war solons give that a thought.

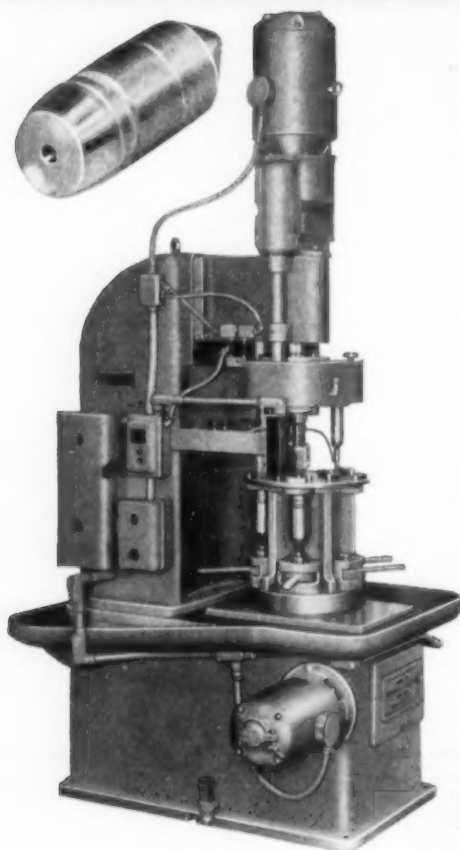
In passing, another reminder that Chapter news must be in by the 15th—or else! For instance, one Chapter Editorial Chairman naively wrote up the account of the April 9th meeting on the 28th, and expected publication in the May issue. Too late, my boy, too late! Now, in early May, we get account of Springfield April meeting—"one of the best A.S.T.E. meetings held in Springfield", the item reads. Well, that would

(Continued on page 142)

THE TOOL ENGINEER

TRACER HOLE MACHINE

DRILLS • REAMS • COUNTERSINKS



A five-station, vertical, automatic-indexing machine for drilling, reaming, and countersinking the tracer hole in 75, 57, 40 or 37 mm. armor-piercing shot. Sequence of operations at each station is:

1. Unload and load.
2. Drill half way.
3. Drill from half way to depth.
4. Ream to depth.
5. Countersink.

One machine can, with minor modifications in the fixtures, be used for any of the four sizes of shot listed above.

SPECIAL FEATURES

The drilling is accomplished in two steps to increase production and reduce drill breakage and wear. The reaming spindle has individual feed to give it twice the travel of the drilling spindles. Electric interlock prevents damage to tools due to operator carelessness. The operator simply loads and unloads at Station No. 1, all other operations being fully automatic.

75 MM. A. P. SHOT
240 PER HOUR

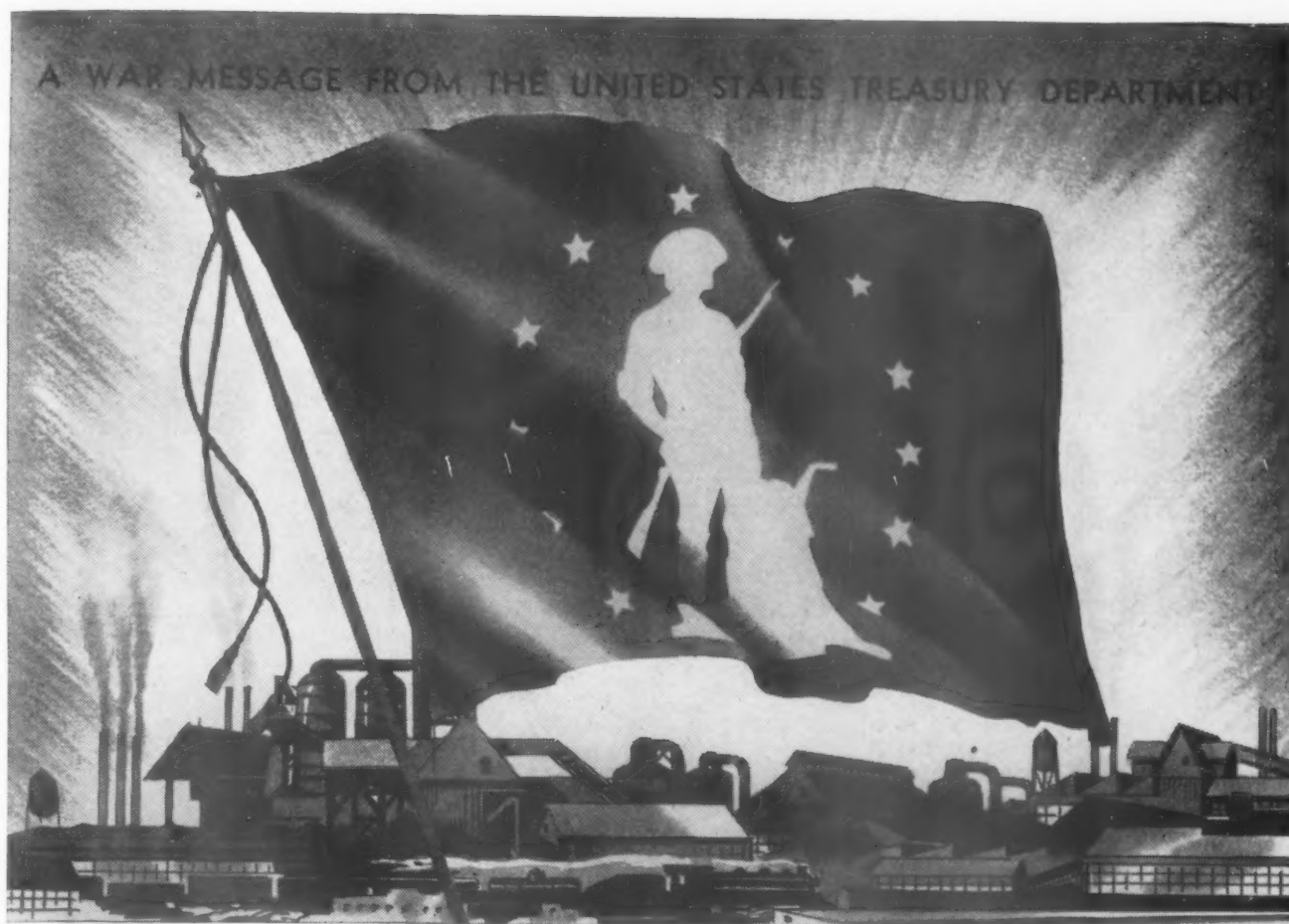


The illustration shows a 75 mm. shot with the tracer hole which is completely finished on the above machine at the rate of 4 pieces per minute or 240 pieces per hour.

We specialize in the design and manufacture of distinctive production machinery and are seeking opportunities to help you obtain greater production at lower unit cost.



REHNBORG-JACOBSON MFG. CO.
Special Machinery
2137 KISHWAUKEE ST. • ROCKFORD, ILLINOIS



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AS PROUD A FLAG AS INDUSTRY CAN FLY

Signifying 90 Percent or More Employee Participation in the Pay-Roll Savings Plan

IT doesn't go into the smoke of battle, but wherever you see this flag you know that it spells Victory for our boys on the fighting fronts. To everyone, it means that the firm which flies it has attained 90 percent or more employee participation in the Pay-Roll Savings Plan . . . that their employees are turning a part of their earnings into tanks and planes and guns *regularly*, every pay day, through the systematic purchase of U. S. War Bonds.

You don't need to be engaged in war production activity to fly this flag. Any patriotic firm can qualify and make a vital contribution to Victory by making the Pay-Roll Savings Plan available to its employees, and by securing 90 percent or more employee participation. Then notify your State Defense Savings Staff Administrator that

you have reached the goal. He will tell you how you may obtain your flag.

If your firm has already installed the Pay-Roll Savings Plan, now is the time to increase your efforts: (1) To secure wider participation and reach the 90-percent goal; (2) to encourage employees to increase their allotments until 10 percent or more of your gross pay roll is subscribed for Bonds. "Token" allotments will not win this war any more than "token" resistance will keep our enemies from our shores, our homes. If your firm has yet to install the Plan, remember, **TIME IS SHORT.**

Write or wire for full facts and literature on installing your Pay-Roll Savings Plan now. Address Treasury Department, Section D, 709 12th St., NW., Washington, D. C.

Make Every Pay Day "Bond Day"



U. S. **WAR Bonds ★ Stamps**

This Space is a Contribution to Victory by

JUNE, 1942

THE BRAMSON PUBLISHING COMPANY

135

NEW LITERATURE

Of Interest to the Tool Engineer



(416) Cutting Oils

Gulf Cutting Oils for Increased Production and Longer Tool Life. 32 pp. Gulf Oil Corporation, Pittsburgh, Pa. Supplemented with many diagrams and tables, this booklet contains practical notes on cutting speeds and tool settings in the machining of nickel steels, stainless steels, high speed steels, wrought

bronzes, and aluminum. Also included are facts on the cemented carbides as used in metal cutting, and hints on tool supports, tool holders, and tool grinding. Information on the properties and uses of Gulf cutting oils is given.

(417) Sequence and Weld Timers

Sequence and Weld Timers — Auto-

matic Control for Resistance Welders. 7 pp. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. This leaflet uses circular charts to show the timing sequence of squeeze, weld, and hold time in terms of numbers of cycles for both pulsation and spot welding. Much other information about sequence and weld timing, pulsation, and spot welding is given. Timers are completely described and illustrated. Operating details cover charging rate, "repeat" and "non repeat" operation, and pulsation timing. Control transformer and relay ratings, control voltage, and timing adjustment range are listed.

(418) Grinding

Cincinnati 10" Plain Hydraulic Grinding Machines. 20 pp. Cincinnati Grinders Incorporated, Cincinnati, Ohio. This catalog completely describes and illustrates the various features and parts of this precision center-type grinder. Features of the design are shown and the complete specifications are given.

(419) Machine Tools

Machine Tools for Drilling, Boring, Tapping, Keyseating, Contour Grinding. 64 pp. Baker Brothers, Inc., Toledo, Ohio. The complete Baker line is presented in this catalog. Each machine is described, illustrated, and the specifications given. Operating features and applications of each machine are given.

(420) Welding

Tungsten Electrodes for Atomic Hydrogen Welding. 4 pp. Vascloy-Ramet Corporation, North Chicago, Ill. This bulletin gives complete information on all sizes of the tungsten electrodes used in atomic hydrogen welding. A brief description of the process is given and complete specifications are listed.

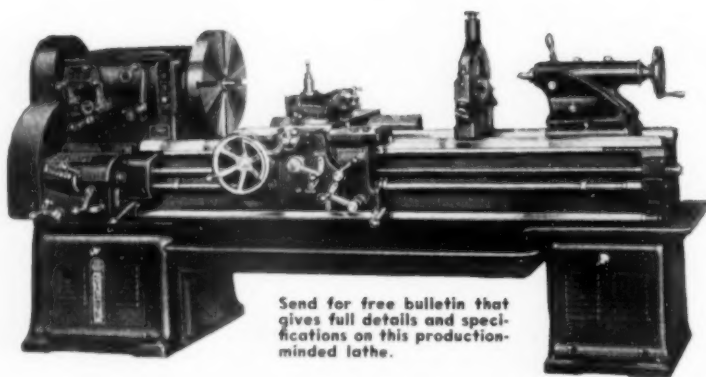
(421) Steel Data Sheet

Braemow Tungsten Molybdenum High Speed Steel. Braeburn Alloy Steel Corporation, Braeburn, Pa. On one side of this data sheet is given the chemical analysis, heating instructions, hardness, and applications of the steel. On the other side is a detailed chemical analysis chart for various steels.

(422) Thread Grinding

Dalzen Precision Thread Grinder. 4 pp. Dalzen Tool and Manufacturing

JUST THE MACHINE!



Send for free bulletin that gives full details and specifications on this production-minded lathe.

BRADFORD



Metalmaster

LATHE

This rugged new lathe is just the machine for the fast tempo of war production! The headstock, driven by a constant speed standard frame motor, is rugged, simple, and exceptionally free from vibration. Heavy walls and a sturdy center bracing rib supports at the short intermediate gear shafts in tapered roller bearings. Double wall one piece apron,—wide range quick change device and many other features which you will find in booklet. Write for your copy today.

ALSO MANUFACTURERS OF DRILLING AND TAPPING EQUIPMENT

THE BRADFORD MACHINE TOOL CO.

CINCINNATI, OHIO

PRECISION TOOLS SINCE 1840

**BRAEBURN ALLOY
STEEL CORPORATION**
(Pittsburgh District)
BRAEBURN, PA.

Pressurdie 3

**HOT DIE
STEEL**

Chemical Analysis

Carbon	Silicon	Chromium	Vanadium	Molybdenum
.38	1.00	5.50	.20	.90

Heating Instructions

FORGING 1650°F./1900°F.
Cool slowly after forging.
ANNEALING 1650°F.
(Brinell 196/217)
HARDENING
Preheat 1200°F.
High Heat 1825°F./1850°F.
Quench in Still Air
Draw 1000°F./1150°F.

Hardness Data

Draw °F.	1825°F. Quench
1000°F.	C-48 to 49
1020°F.	C-45 to 47
1050°F.	C-43 to 44
1100°F.	C-40 to 41
1150°F.	C-35 to 36
1200°F.	C-30 to 31

Applications

Die Casting Dies for Aluminum and Magnesium Alloys

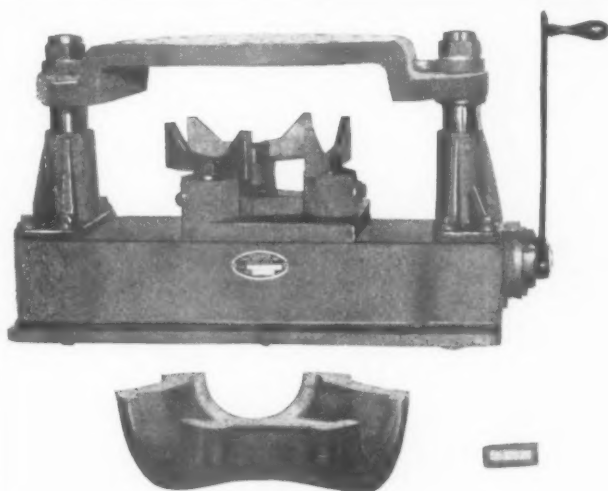
Plastic Moulds

WRITE FOR LITERATURE

BRAEBURN ALLOY STEEL CORPORATION

BRAEBURN

PENNA.



FIXTURE TO DRILL SIX HOLES IN PROPELLER HUB.
PART LOCATES ON EQUALIZING VEES AND SQUARES
UP TO THE TOP PLATE

SWARTZ

**STANDARD FIXTURES
STILL AVAILABLE ON
SHORT NOTICE**

**SPEED UP YOUR
TOOL DELIVERIES BY
SAVING IN DESIGN**

PATTERN & CASTING DELIVERIES

ASK FOR CATALOG No. 941

SWARTZ TOOL PRODUCTS Co., Inc.

13330 FOLEY

Detroit, Michigan

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St. Louis—Mill Supply & Mach. Co.

Oneida, N. Y.—W. F. Himmelsbach
Pittsburgh—J. W. Mull, Jr.
Toledo—J. W. Mull, Jr.
Philadelphia, Pa.—Morgan Tool
& Equipment Co.

Company, 12255 E. 8 Mile Rd., Detroit, Michigan. This folder completely describes the Dalzen No. 1 thread grinder. The machine is illustrated and the specifications are given.

(423) Lathe Practice

Now available are four blueprint wall charts; *Lathe Cutting Tools*, *Thread Forms and Formulas*, *60 Degree V-Type Thread Dimensions*, and *The Modern Backgeared Screw-Cutting Lathe*. Atlas Press Company, Kalamazoo, Michigan. Each chart has been prepared at the

suggestion of prominent industrial arts instructors and presents reference information for the experienced machinist as well as for the beginner. The charts are large, easy to read, and printed on durable ledger paper. Copies of the Atlas charts are 15 cents per set in coin or stamps to cover handling and postage.

(424) War Production

How One Company Tackles the War Production Problem. 20 pp. Lyon Metal Products, Incorporated, 3125 Clark

Street, Aurora, Ill. This booklet gives the actual case history of how a manufacturing company obtained prime and subcontracts and the plan it followed in switching from peace-time to war production.

(425) Dust Collector

Filtaire Portable Dust Collector for 101 Industrial Uses. 4 pp. Edward Blake Company, Newton Centre, Mass. Diagrams and illustrations in this folder show the industrial applications of this collector. Complete specifications of the machine are given.

(426) Industrial Brushes

Keystone Industrial Brush. 24 pp. Keystone Carbon Company, Inc., St. Marys, Pa. This is a catalog of price lists on metal-graphite brushes for low voltage generators and slip ring applications, and carbon-graphite brushes for motors and generators. Also shown are fractional horsepower and automotive brushes, metal-graphite and carbon contacts, negative temperature coefficient resistors, and Selflube porous bronze and iron bearings.

(427) Lift Table

Colossal In a Small Way. The Service Castor and Truck Company, Albion, Michigan. A combination bench, truck, and lifter is described as to design and construction in this folder. Its many uses are listed, specifications and prices given.

(428) Vise

A Big Vise for the Big Jobs. 2 pp. David J. Ross Company, Benton Harbor, Michigan. Called the Rousselle Victory Vise, this vise is described and illustrated on a sheet suitable for data filing. Advantages are shown by means of a diagram and complete specifications of the vise are given.

(429) Salt Bath Furnace

Where Should Heat Treating Heat Go? 4 pp. Upton Electric Furnace Division, Detroit, Michigan. Discussing the various types of internally heated salt bath furnaces and pots, this folder gives hints on their selection, tells how to avoid superheating and rapid decomposition of carburizing salts, and what the effect is of pot shapes on the flow of heated salt. Also included are comments on the furnaces and pots required for hardening of Molybdenum and high speed steels.

(430) Metal Cleaning

Metal Cleaning In War Time. 50 pp. The Magnus Chemical Company, Inc., Garwood, N. J. Discussed in detail in this handbook are the metal cleaning problems in the production of shells,

"Versatility" and "Speed" Characterize these two MARVEL SAWS

● For the stockroom of this special machinery builder, what better combination could you ask . . . a MARVEL No. 8 Metal Cutting Band Saw for versatility, and a MARVEL No. 48 High Speed Hack Saw for miscellaneous cutting-off.

For all-around versatility, the universal No. 8 Saw is unequalled. It will cut at any angle from 45° right to 45° left; will nip off a 1/4" drill rod or cut down an 18" x 18" die block. It has a large "T"-slotted planer type table for setting up big work and a quick action machine vise for small pieces. It has a combination hand and/or power feed. It does cutting-off, mitering, notching and indexing, and saves hours of machining by roughing pieces and parts to size or shape. In many shops it eliminates warehouse delays and "cutting extras."

The MARVEL 48 Hack Saw is an exceedingly fast-cutting, light-duty saw (Capacity 6" x 6") designed for high-speed cutting-off. It is designed for miscellaneous "run-of-the-hook work" and is surpassed in speed only by the heavy-duty, all-ball-bearing MARVEL 6, 6A, or 9A High-Speed Saws.

Buy from your local distributor.

MARVEL SAWS

ARMSTRONG-BLUM MFG. COMPANY

5700 Bloomingdale Ave.

"The Hack Saw People"

Chicago, U. S. A.

Eastern Sales: 225 Lafayette St., New York



20-25 BEARINGS PER SQUARE INCH!

Many hours of slow and careful hand-scraping by craftsmen on Lombard Surface plates produce this exceptional high degree of precision. Designed for use where extreme surface accuracy is required, these plates are made of high-grade close-grained, semi-steel type iron, especially heat-treated to relieve

casting and machining stress. Every stage of manufacture is under rigidly supervised control. The construction is extra rigid, with heavy ribbing and three point suspension to maintain extreme accuracy indefinitely. Compare, size for size, the weight of Lombard surface plates with others.



Angle Plates,
V Blocks, Parallels
also available.

SCRAPED SURFACE PLATES

Standard Sizes Available for Prompt Delivery

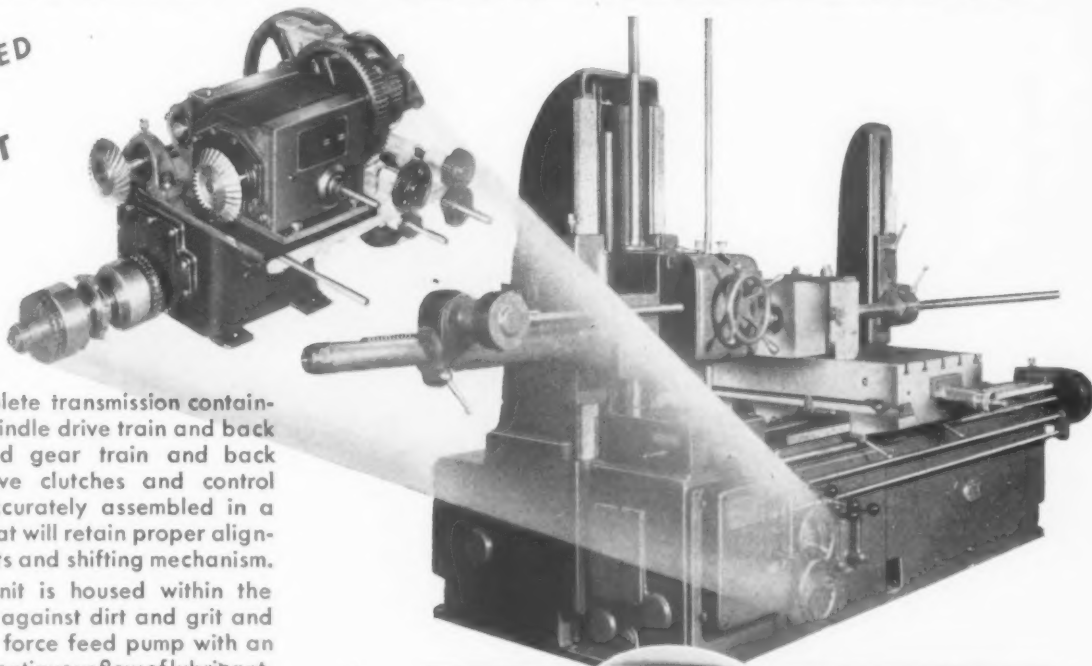
SIZE (Inches)	WT. Approx. in lbs.
14 x 18	95
18 x 24	190
24 x 24	295
24 x 36	450
24 x 48	900
48 x 48	1700
60 x 72	4850

WRITE FOR DETAILS AND PRICES

LOMBARD GOVERNOR CORPORATION
100 MAIN ST. ASHLAND, MASS. U. S. A.

ADVANCED BORING MILL DESIGN

IS EMBODIED
in this
**COMPACT
DRIVE
UNIT**



HERE is a complete transmission containing the main spindle drive train and back gears, the feed gear train and back gears, the drive clutches and control shafts—all accurately assembled in a compact unit that will retain proper alignment of all shafts and shifting mechanism.

The entire unit is housed within the base—sealed against dirt and grit and supplied by a force feed pump with an abundant and continuous flow of lubricant.

Write for literature describing other advanced features that make this an exceptional boring mill.

THE YODER SALES CO.

5500 WALWORTH AVENUE
CLEVELAND, OHIO

shell cases, fuses, and other war production parts. Also covered are the outstanding cleaning operations required in the production of ordnance, small arms, material, and transport equipment. The handbook is complete with many flow charts, illustrations, and diagrams of washing machines.

(431) Tool Brazing and Repair

Low Temperature Brazing News. 2 pp. Handy & Harman, 82 Fulton Street, New York, N. Y. This bulletin shows how cutting tools can be reclaimed and

how to braze your own tool tips. The process is described and applied to many different tools, each being illustrated.

(432) Ball Bearing Shafts and Housings

Details of Design of Shafts and Housings for Ball Bearings. New Departure, Bristol, Conn. Including such subjects as proportions and finish of bearing seats; locknut threads; recommended shaft shoulders; designing to aid disassembly; locating and clamping methods; and the use of adapter

sleeves, this booklet has been written for the machine designer interested in applying ball bearings. Line drawings illustrate each subject.

(433) Shaft Straightening

General Shaft Straightening Attachments. 4 pp. General Manufacturing Company, Detroit, Mich. Uses and advantages of these straightening attachments are mentioned in this folder. The different types are illustrated, described, and their construction given. Complete specifications are included.

(434) Precision Equipment

Challenge Precision Equipment for Tool and Machine Industries. 12 pp. The Challenge Machinery Company, Grand Haven, Mich. This new catalog illustrates, describes, and lists specifications on the Challenge line of lapping plates, layout surface plates, bench plates, work benches, surface plates, straight edges, parallel blocks, angle plates, V-blocks, and cut-off machines.

(435) Production Tools

Catalog E. 292 pp. Illinois Tool Works, Chicago, Ill. This bound catalog describes, illustrates, and gives the prices of high speed "Illinite" production tools and Shakeproof products. The aim of the catalog is to have it serve as handy reference text on metal cutting problems by summarizing helpful data on the correct design, selection, and use of metal cutting tools. Price information on standard tools is segregated from the body of the catalog and placed in a pocket on the back cover.

(436) Motor Driven Tool

Dremel Model No. 2 Moto-Tool. 6 pp. Dremel Manufacturing Company, Racine, Wisconsin. This folder describes, illustrates the various uses, and lists many accessories for a motor driven tool that is said to grind, drill, carve, rout, and polish.

NEW PRODUCTION SCHEDULES

DEMAND THESE HAMMOND CARBIDE TOOL GRINDERS



HAMMOND "4"

TODAY'S blazing production pace calls for sharp cutting tools. "By Guess and by Gosh" methods are out. There's no better way to keep 'em sharp, easily and accurately, than with Hammond's Modern "4" Chip Breaker Grinder and "6" Carbide Tool Grinder. Don't waste another minute, write today for complete data.

HAMMOND "4"
CHIP BREAKER GRINDER

HAMMOND "6"
CARBIDE TOOL GRINDER

HAMMOND "10A"
CARBIDE TOOL GRINDER

NEW! No Spray No Splash
10" and 14"
Carbide Tool Grinders

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HAMMOND "6"

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NEW BOOKS

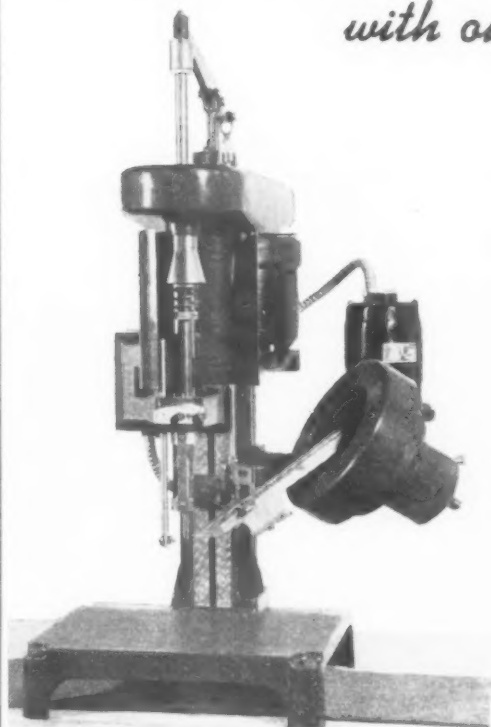
Dunwoody Machine Job Training Units by the Staff of the Dunwoody Industrial Institute. This is a set of six spiral bound books along with an instructor's guide. They are priced as follows: Grinder Unit \$1.25, Lathe Unit \$1.35, Shaper and Planer Unit \$1.25, Bench Work Unit \$1.35, Drill Press Unit \$1.25, Milling Machine Unit \$1.25, and the Instructor's Guide 75 cents. American Technical Society, Chicago, Ill.

The result of years of use and testing, these units or manuals have been improved year by year by actual experience. There is a job instruction sheet for each job plus questions for each and a job sheet check. Additional help-

THE TOOL ENGINEER

ASSEMBLIES MADE IN SECONDS

with our modern **SCREWDRIVERS**



MODEL A

Where old methods require minutes this fine production screwdriver can do the same assembly job in a matter of seconds! Three different models with magazine feed are available for screw sizes from number 2 x $\frac{1}{8}$ long to $\frac{5}{8}$ cap screws. Our Model A was designed for hopper feeding and driving of small screws which heretofore could only be handled by hand with magnetized screwdrivers. Send us sample assemblies today for production estimates!

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(FOUR WAYS TO SAVE TIME AND MONEY)

✓ **1 TUNGSTEN CARBIDE LATHE AND GRINDING CENTERS**
Circle Tip Tool Company's centers are equipped with a hard wear and gall resisting metal, lasting from 50 to 100 times as long as high speed steels. Standard sizes in stock, special centers made to order.

✓ **2 TEN STANDARD CARBIDE TIPPED TOOLS**
Available for immediate shipment in two grades of "Tamaloy," a new *Tungsten Carbide*. Circle Tip standard tools are finished ground, ready for use, or may be reground to meet your particular cutting problems.

✓ **3 "TAMALOY" CARBIDE BLANKS**
"Tamaloy" blanks can be furnished in special shapes approximately .015" oversize, allowing you to make your own form tools. Standard "Tamaloy" blanks from stock.

✓ **4 SPEEDALOY**
Speedaloy is a cast cutting alloy made of a special Tungsten Chromium alloy. It fills the breach between high speed steels and Tungsten Carbide in both performance and price. Speedaloy comes in solid Tool bits, flats and tipped tools.



HIGH RESISTANCE TO ABRASION

CATALOG AND PRICES ON REQUEST

The CIRCLE TIP TOOL COMPANY Inc., EAST ORANGE, N.J.

ful suggestions include hints for blueprint reading, list of reference material, suggested demonstrations by instructor, and check list of parts.

These units help to conserve material for the job that is started. One group can start on the lathe, another on the milling machine and so on, thus all machines are in action.

Metallurgy by Carl G. Johnson, Assistant Professor of Mechanical Engineering, Worcester Polytechnic Institute. 262 pp. \$2.50. American Tech-

nical Society, Drexel Avenue at 58th Street, Chicago, Ill.

This book is intended to present information on the subject of metals in such a way that the average individual who has no opportunity to study the subject will be able to obtain some working knowledge of the manufacture and behavior of metals and their alloys.

This book is a revision of the first edition and data has been added on bearing alloys, aluminum alloys, copper and copper alloys, alloy steels, cast iron, and heat treatments.

This book has 127 illustrations and is thoroughly indexed. Quiz questions appear at the end of each chapter and the book is covered in a durable cloth binding.

Technidata by Edward L. Page. 64 pp. Spiral binding \$1, cloth binding \$1.50. Norman W. Henley Publishing Company, 17 - 19 West 45th Street, New York City.

This book gives essential data on mathematics, physics, chemistry, engineering, and mechanics. Because, as a student, the author found himself carrying around too many books and spending too much time looking up information in various sources, he compiled in one small book all the important facts and rules heretofore found in many.

Presented in a relatively few pages, facts, figures, theory, definitions, laws, formulas, simple calculations, diagrams, and tables are given. To accomplish his aim, the author has omitted unnecessary data and long explanations.

—HANDY ANDY SAYS—

(Continued from page 134)


have been news—in the May issue, only, that went to press a month ago. However, I'm going to give the Springfield boys a break by printing the high lights here, mainly because we're to have the Semi-Annual there and Frank Curtis, who is Convention Chairman, might like a bit of advance publicity. (Show us the town, Frank!) Speakers included School Supt. Mitchell of Easthampton, who told the boys what made the Japs tick. (What we're really interested in is stopping their clock). Irwin Holland, Regional Director from Hartford, told the boys about St. Louis, also installed the new officers. Mike Brennan, retiring Ch'man, got a rising vote of thanks and Carl Rising got a rise out of the boys a/c his Symposium on Welding, to which Messrs. Bullock, Lucas and Von Rhor made impressive contributions. Well, welding's a hot topic, as Ray Morris said. During the evening, Ex-Prex Frank Curtis dropped in, along with Ad Potter, local boy who made Nat'l. H. Q. as Exec. Secy. In reading, I passed up the chicken dinner, but mention of that clambake, come June, that Charley Stonerod is to handle! Oh boy! Tell me about it—but in time for the July issue. Meanwhile, keep the home fires burning.

Handily Yours,



THE TOOL ENGINEER

25 MORE GUNS PER GRIND



TAPER A

Tools: IIT70 Grade KM — 15° SCEA — 30° ECEA

Speed: 245 RPM — 210 to 235 FPM

Feed: .0225"/Rev.

Length of Cut: 28"

Depth of Cut: 1/8"

TAPER B

Tools: IIT70 Grade KM — 15° SCEA — 30° ECEA

Speed: 296 RPM — 158 to 235 FPM

Feed: .0225"/Rev.

Length of Cut: 34"

Depth of Cut: 1/8" to 3/16" average



Style No. 11

with KENNAMETAL tools

● In finish machining heat treated alloy steel gun barrels, KENNAMETAL Style 11 tools completed an average of 40 pieces per grind, as compared to an average of 15 pieces per grind completed by competitive carbide tools. That fact means KENNAMETAL saved hours of "down time" for the manufacturer, helped him to produce **more guns more quickly**.

The superior strength and hardness of KENNAMETAL permit greater machining speeds and removal of more metal between grinds than other carbides. If you machine steels in hardnesses up to 550 Brinell, KENNAMETAL tools can turn "down time" into production time for you.

WRITE FOR THE KENNAMETAL VEST POCKET MANUAL

KENNAMETAL: INVENTED AND MANUFACTURED IN U.S.A.





McKENNA METALS Co.

600 LLOYD AVE., LATROBE, PENNA.

Foreign Sales: U. S. STEEL EXPORT CO., 30 Church St., New York
(Exclusive of Canada and Great Britain)

APEX PRODUCTION TOOLS

Aircraft . . . Automotive . . . Manufacturing



Apex-Phillips Power Bits, for all electric, air and spiral drivers, are made from special shock-resisting steel, heat-treated and tempered to give maximum hardness, toughness and wear resistance.

Apex Power Bits for Slotted Head screws, for all electric, air and spiral drivers, range in size from No. 4 to No. 18 screws.

Apex Universal Joints have no projecting ears, screws or sharp corners to catch; can't overtravel their working angle of 35° and lock; are durable and smooth running.

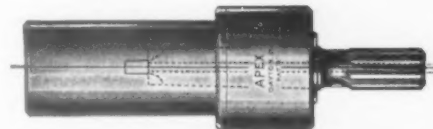
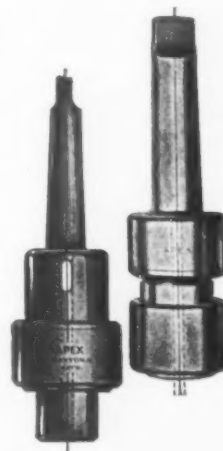
Apex Universal Socket Wrenches are available for all kinds of speed braces and extension shanks.

Apex Safety Friction Chucks maintain their friction setting . . . are not affected by end thrust . . .

can be used in any position . . . tools can be changed while machine is running . . . chuck slips before breaking tool—these features save time and money.

Apex Floating Tool Holders make possible accurately reamed and tapped holes on any type equipment . . . amount of float varies from a few thousandths to 1/8" . . . with Quick Change Drill collet, tools for series of operations can be changed without slowing down the machine . . . available in Extended Socket and Short Nose types for Morse Taper or straight shank tools.

Apex Vertical Float Tapping Chucks are used for multiple tapping. Vertical float permits each tap to enter free and tap its hole true to size. Used for power feed, lead screw or hand feed tapping. Same collets and tools as Friction Chucks.



THE APEX MACHINE & TOOL CO.

1106 Patterson Blvd.

Dayton, Ohio

DON'T LET YOUR TAPS GET DULL

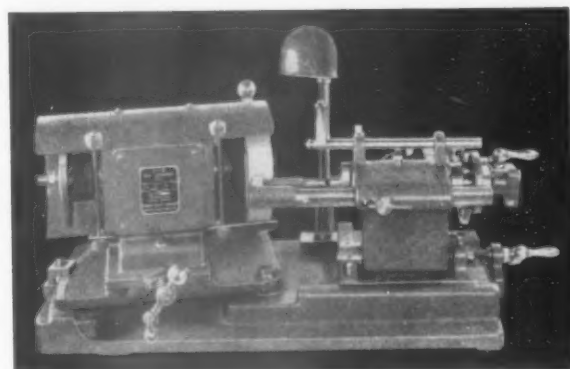
Keep 'em Sharp

ON THE

J-B TAP GRINDER

No longer is it necessary to discard taps for lack of a rapid, low cost method for accurate chamfer grinding. The J-B TAP GRINDER will do the job by grinding uniform relief on the chamfer of every land. It will grind right- and left-hand taps with 2, 3, 4, 5, 6, 8 and 10 flutes. Capacity—No. 0 to 2". There are no cams to change—no cams to wear, yet the amount of relief may be changed easily.

Many other tools may be ground to advantage on the J-B TAP GRINDER, especially countersinks. Time and tools are valuable—send the coupon today for complete information on the J-B TAP GRINDER.



Please send me complete information on the J-B TAP GRINDER.

NAME TITLE

COMPANY

STREET

CITY STATE T.E.

MAIL THE COUPON TODAY!!

EDWARD BLAKE COMPANY

634 COMMONWEALTH AVE.
NEWTON CENTRE, MASS.

A. S. T. E. DOINGS



Chicago

The Chicago Chapter held its meeting at the Mid-West Athletic Club on Monday, May 4th. Following dinner at 7:00 o'clock was the general meeting and technical session, which was called to order by Roy Hofer, the chairman. Mr. Hofer gave a brief resume of the activities of the Chicago Technical Society, after which a motion was made and seconded to join the Society. The motion was carried.

Two films were shown by the Aluminum Company of America, one entitled "Mine to Metal and Fabrication Processes," and the other "Unfinished Rainbows." Mr. I. H. Dawson made some remarks on "Aluminum, the Material." Mr. Dawson discussed physical properties of aluminum and some of its characteristics. Questions on machining of aluminum were answered by Mr. N. D. Jones, of the Aluminum Company.

Others attending the meeting who spoke, included Mr. O. W. Winter, National President who made some re-



Adrian L. Potter, new executive secretary of the A.S.T.E., is now at his desk at the national headquarters in Detroit. A University of Maine man whose hometown is Springfield, Massachusetts, Mr. Potter headed up the Convention and Visitors Bureau there. Greatly interested in Boy Scout work, he has also been a fireman, a machinist, and was a 2nd Lieutenant in World War I.

marks on the Society and aims for the coming year, and Mr. Frank Martindell, who made a few remarks on vocational schools.

Cleveland

The after dinner speaker for the Cleveland Chapter's meeting of May 8th at the Mid-Day Club was George D. Webber, President of the Webber Gage Company, who spoke on "Gage Blocks: The Keystone of Interchangeable Manufacture."

Mr. Webber brought out various important points about the care and handling of gage blocks. He very much stressed the point of keeping gage blocks clean and free from dirt and abrasive materials to assure the owner of longer life for the blocks.

Burnham Finney, Editor of American Machinist, also spoke at this meeting, which was the last of the current season and had a turn-out of 110 for dinner and upwards of 190 for the technical session.

Columbus

The Columbus Chapter held its May 14 dinner meeting at the Hotel Fort Hayes.

Main speaker for the evening was Mr. Lincoln E. Mehlhope, sales engineer in charge of the grinding machine division of the Cincinnati Milling Machine & Cincinnati Grinders, Inc. His subject was entitled, "Centerless Grinding with Special Reference to Shell Grinding."

Dayton

The Gibbons Hotel was the scene of the May 11th meeting of the Dayton Chapter. Guest speaker for the evening was Ralph Lilleberg, Sales Engineer of The Sheffield Corporation, who gave a talk on gage practice. Musical entertainment for the evening was furnished by "The Old Timers."

Detroit

The Detroit Chapter held its May meeting on Thursday, May 13th in Huyler's Concourse Dining Room at the Fisher Building.

The speaker for the evening was Mr. E. W. P. Smith, Consulting Engineer of The Lincoln Electric Company, Cleveland, Ohio. Mr. Smith's discussion covered the physical characteristics of cast iron and steel as materials, the use of material applied specifically to welding, and discussion of the Fleet-Fillet



Meeting at the Hotel Sheraton in Springfield, Massachusetts, on Sunday, May 10, national officers and New England area leaders of the A.S.T.E. laid the groundwork and the committee set-up for the Society's War Production Conference which will be held in Springfield October 16 and 17. Pictured above at this meeting are, front row left to right: Earl Phinney, secretary of the Little Rhody Chapter; Harry J. Hauck, chairman of the Hartford Chapter; Charles H. Stonerod, chairman of the entertainment committee of the Springfield Chapter; Andrew P. Schoeffler, chairman of the Southern Connecticut Chapter; Edward C. Sheldon, chairman of the Springfield Chapter; Frank W. Curtis, general chairman of the conference; Ray H. Morris, national 1st vice-president; Frank R. Crone, national treasurer; and Carl G. Rising, 1st vice chairman of the Springfield Chapter. In the back row, left to right, Nelson Cox, secretary of the Schenectady Chapter; Kenneth Thomas, publicity chairman of the Hartford Chapter. Edward J. Berry, chairman of the Little Rhody Chapter; Ben Brosheer, 1st vice-chairman of the Northern New Jersey Chapter; John Lindgren, Regional Director; Adrian L. Potter, national executive secretary; Victor H. Erickson, publicity chairman of the Worcester Chapter; Arthur H. Mc Briar, secretary of the Springfield Chapter; M. H. Jennings, secretary of the Twin States Chapter; and Michael J. Brennan, past chairman of the Springfield Chapter.

Others that attended the meeting were J. W. Geddes, chairman of the Boston Chapter; Warren Ames, 1st vice chairman of the Boston Chapter; E. J. Stone, Springfield Chapter; M. J. Weldon, secretary of the Southern Connecticut Chapter; and Clyde L. Hause, national secretary.

After the Emergency ... What?

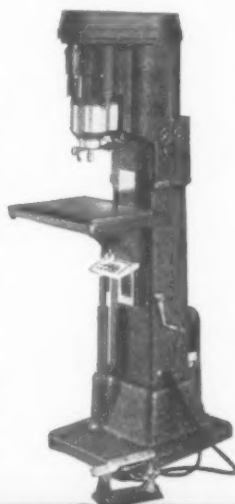


Tooled today for war time aluminum fuse bodies, this *standard* Haskins Tapper can quickly and inexpensively be changed over to peace time production needs.

It's natural today to think of machinery in terms of *immediate* output. But when the war's over—what then?

That is when the *lasting* quality of really fine equipment will pay its greatest return.

Haskins Tappers bought today for war time production are *standard* machines. A few quickly made adjustments — perhaps an inexpensive fixture change — and your Haskins Tappers will be ready to help you hold *down* peace time production costs—so that you can keep sales and profits *up*! R. G. Haskins Company, 2756 W. Flourney Street, Chicago.



WRITE FOR BOOKLET
—“Holding Fixtures for
Haskins Tapping Ma-
chines.” Contains many
new ideas.



HASKINS

Precision
TAPPING
EQUIPMENT

Upp and Adam

—By Mason and Hahn

FOR VICTORY
HELP US PUSH
THIS THRU
BUY
BONDS AND
STAMPS

FOR DETAILS WRITE
**WELDING EQUIPMENT
AND SUPPLY CO.**
222 LEIB ST.
DETROIT, MICH.

**SAY ADAM WE BETTER
TRY THIS EUREKA TOOL -
STEEL WELDING ROD -
IT'LL HELP UNCLE SAM
SCOUT OR
SUMPIN'?**

**WHAT AM
I - A BOY
SCOUT OR
SUMPIN'?**

**MAYBE NOT BUT YOU'LL
BE SCOUTIN' AROUND FOR
A NEW JOB IF YOU THROW
AWAY ANYMORE
DIES**

**WELL GEE
I SAVE ALL I
CAN - DON'T I?**

**YEAH? ABOUT ALL
YOU SAVE AROUND
HERE IS YOUR
STRENGTH!**

**BUY DEFENSE
BONDS WITH
WHAT EUREKA
ELECTRODES
SAVE YOU -**

method of welding. He also touched on the economic use of materials, the procedure control, and cost reduction.

Elmira

The regular monthly meeting of the Elmira Chapter was held on May 4th at the Mark Twain Hotel.

The speaker for the technical session which followed the dinner was Mr. Albert E. French, Instructor and Advisor connected with the Elmira Vocational Schools' Faculty. Mr. French's subject

was, "Vocational Education in Defense Training."

Fond du Lac

The Fond du Lac Chapter held its regular monthly dinner meeting on May 8th at the Takodah Club.

The principal speaker of the evening was Major E. P. Reed, Chief of the Inspection Division, Chicago Ordnance District. Major Reed talked on the subject "Ordnance Inspection." He presented an interesting outline of Gov-

ernment requirements in the manufacture of munitions equipment, and reasons for sub-contractors adhering to the specifications and dimensions shown on drawings.

After this talk, a technicolor and sound film, "Empire on Parade," was shown.

Out of town guests present at the meeting included Mr. R. W. Keese, Chief Engineer, of the Wisconsin Axle Div., Oshkosh, Wis.; Mr. R. W. Roush, Chief Metallurgist of the Timken-Detroit Axle Co.; and Mr. Wm. J. Iekel, A.S.T.E. Chairman of the Milwaukee Chapter.

Hamilton

The monthly meeting of the Hamilton Chapter was held at 8:00 o'clock at the Welland House in St. Catharines, Ontario. This May 7th meeting attracted 104 people for dinner and 140 for the meeting after the dinner.

The guest speaker of the evening was Mr. R. F. Drummond, President of the National Broach and Machine Company, Detroit. Mr. Drummond was introduced by Mr. Bill Watkins of McKinnon Industries, Limited. The subject of Mr. Drummond's address was "Modern Developments in Gear Tooth Finishing," which was illustrated with photos of gears and machines.

Hartford

The May meeting of the Hartford Chapter was held on the 4th with dinner at the City Club. The technical session, which met immediately after the dinner, was held at the Hartford Gas Company's auditorium.

A ten minute movie opened the meeting. This film, "Height Gages and Standard Indicators," is one of a series of 50 educational films developed by the U. S. Office of Education to assist in the training of defense workers.

Following the picture two "Gage Talks" were given. Mr. John B. Freysinger of North & Judd Mfg. Co., New Britain, Conn., gave a short description of an ingenious method he once developed to re-surface the bed of a drop hammer. Mr. Art Merry, Chief Production Engineer of Pratt & Whitney Aircraft explained the function of a new "device" in popular use at the Aircraft.

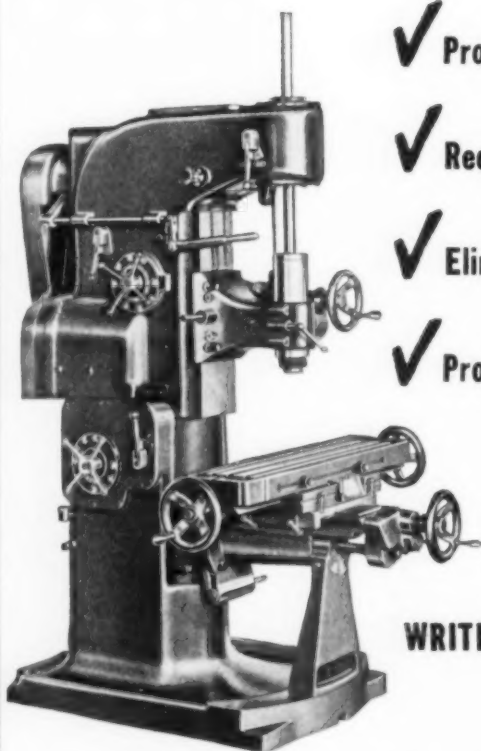
Guest speaker of the evening was Mr. G. N. Sieger, president and general manager of the S. M. S. Corp., Detroit, Michigan. His speech expounded the merits of modern welding over other traditional fastening and joining methods.

Houston

175 people attended the April 27th meeting, which was held at the Houston Country Club.

"4 Good Reasons"

FOR USING THE KNIGHT MILLER



- ✓ Produces More Work
- ✓ Requires Less Equipment
- ✓ Eliminates Hours of Layout
- ✓ Produces Quality Results

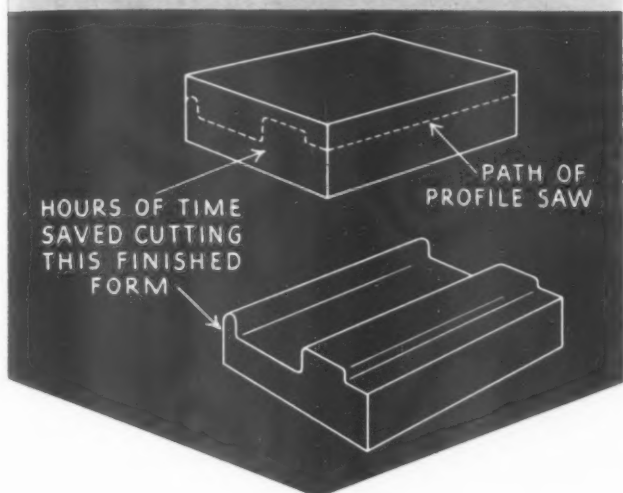
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Rigidity, Accuracy, Speed, and Power—all are assured with this versatile miller. A wide range of milling and boring operations, including angle work and jig boring, are possible. The operator's production time is cut through easy reading dials and a readily accessible shift lever. Greater Production is the watchword! You get assurance of that with this KNIGHT MILLER!

W. B. KNIGHT MACHINERY CO.

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SAINT LOUIS, MO.

★ STEP UP ★ PRODUCTION



WITH

MILFORD

★ PROFILE SAW ★

YES... a contour sawing machine, or any good vertical band saw machine, with fixtures, will do a real job. Equipped with MILFORD PROFILE SAW you make a real saving to boot.

Your basic machine tools can be kept on straight production work by cutting all complicated shapes, such as parts of all kinds, special tools, dies and jigs, this up-to-the-minute way.

Remember... a machine for contour sawing is no better than its saw. The saw does the cutting, not the machine.

MILFORD PROFILE SAW is made by the world's largest, most experienced producer of metal cutting band saw. It is carried in stock by Mill Supply Distributors in every locality.

Perhaps you have a band saw machine that can be easily adapted to Profile Sawing. If so, write us at once for directions. Write also for a free sample of MILFORD PROFILE SAW, giving specifications of blade you now use and description of cutting job and machine.

THE HENRY G. THOMPSON & SON COMPANY
NEW HAVEN, CONNECTICUT
Also makers of MILFORD RESISTOR HACKSAW BLADES

IT'S A

GATCO

**CARBIDEBORER
MODEL 2-V**

QUESTION—

Is a Repeat Customer

a Satisfied One?

One, Runs a Dozen

Gatco Carbideborers,

3 SHIFTS, 7 DAYS

A WEEK.

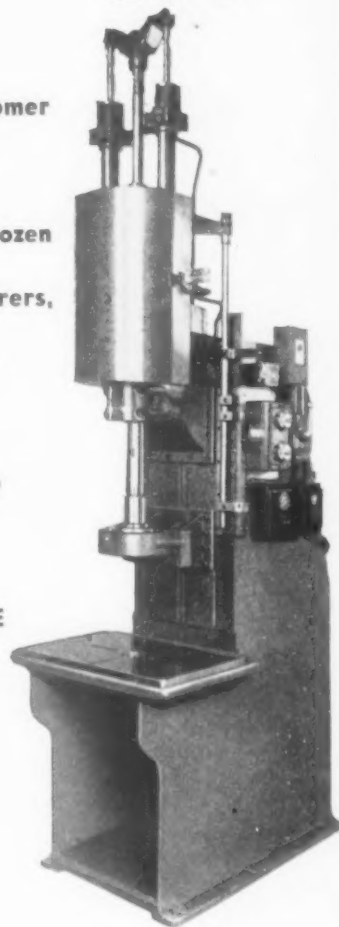
IS HE SATISFIED?

HE IS NOT—

HE WANTS MORE

AND HE WANTS

THEM NOW!



The carbideborer roughs and finishes, even in one pass, speedy and exact as only the combination of tungsten carbide, hydraulic feed, vee belts, and the GATCO rotary pilot bushing can do it!

GIERN & ANHOLTT TOOL CO.

1312 MT. ELLIOTT, DETROIT, MICHIGAN

CHICAGO: BANSBACH MACHINERY CO.

NEW YORK: TRIPLEX MACHINERY CO.

CLEVELAND: CLEVELAND DUPLEX MACHINERY CO.

MILWAUKEE: C. A. KUNZ

INDIANAPOLIS: HENRY R. VOELKER

A.S.T.E. DOINGS

Major Grig, U. S. Supply Depot engineer gave a talk on maintenance of equipment and material and the problems and how they meet them.

Also at this meeting was Mr. H. E. Linsley of the Wright Aeronautical Corporation, who showed a film on the Wright Whirlwind engine and a trip through the plant of the Wright Aeronautical Corporation at Paterson, N. J.

Milwaukee

The Colonial Room of the Republican Hotel was the scene of the May 14 meeting of the Milwaukee Chapter.



The group pictured above are a part of the 175 members and guests of the Houston Chapter who attended the April 27th meeting of the A.S.T.E. at the Houston Country Club.



"RS" Collapsing Tap—Five sizes—1-1/4 to 3-13/16" with blade chasers. Larger sizes up to 5" with circular chasers. Shown equipped for stationary spindle.

Companions in PERFORMANCE!



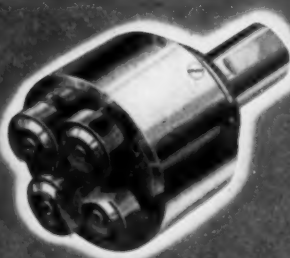
Yes sir, *ANOTHER* Namco "Double Duty" Tool—
THE NEW "RS" COLLAPSING TAP

Remember—Namco "DR" and "DS" Circular Chaser Dies use interchangeable chasers and are also quickly adapted to hollow milling by substitution of cutters and holding blocks.

By similar economical planning—One Basic Design in the new "RS" Tap serves both revolving and stationary spindle machines. Quick and positive opening action, fine diametric adjustment and ground thread chasers offer the same precision and trouble-free production you are now getting from Namco Dies. Ask for proof of this outstanding performance.



"DS" Circular Chaser Die for stationary spindles. Sizes 3/8 to 4-7/8". Readily adaptable to Hollow Milling work.



"DR" Circular Cutter Hollow Milling head for revolving spindles. Sizes 5/16 to 4-7/8". May be quickly changed for threading.

NATIONAL ACME CO.

170 EAST 131ST STREET • CLEVELAND, OHIO

ACME GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND
AND • CPMW MAPHINE PRODUCTS • THE PHARMING • LIMIT SWITCHES • SOLENOIDS • POSITIVE CENTRIFUGES • CONTRACT MANUFACTURING

Speaker of the evening was Mr. Hammond of the General Electric Corporation. His subject was, "Beating Time" and included the showing of a sound movie.

Chapter chairman, Julius A. Reidl, because of business which takes him away from Milwaukee, tendered his resignation and turned his gavel over to the new chairman, Bill Iekel.

Peoria

The May meeting of the Peoria Chapter was attended by 96 members and guests.

Peter F. Rossman, chief development research engineer of the Curtiss-Wright Corporation spoke. His talk, augmented by slides, depicted operations and tooling in the aircraft plant. A movie was also shown entitled "Curtiss-Wright Answers the Call For Quality."

Pittsburgh

The regular monthly meeting of the Pittsburgh Chapter was held at Stouffer's Restaurant on Friday, May 1st.

The speaker for the evening was Mr. Carroll Edgar, Chief Tool Engineer for the Vascloy-Ramet Corporation, who spoke on increasing production. His talk was illustrated through chalk diagrams. His talk had to do with the fine points involved in preparing a metal cutting tool of the carbide type.

Rochester

Guest at the May 13 meeting of the Rochester Chapter was the new executive secretary, Adrian L. Potter.

Mr. Herbert Gardner of the DeWalt Products Corporation showed moving pictures of mass production through woodworking. Movies of the war were also shown.

Rockford

The May 7th meeting of the Rockford Chapter was in the form of a visit

THE TOOL ENGINEER

NEW! PORTER-CABLE CHAIN DRIVE 7" SHAPER



**FASTER
SMOOTHER
No Chatter-Marks
No Gear Backlash**

New higher cutting speed . . . new greater precision of work . . . new ease of operation . . . that's what you get with this new Porter-Cable 7" Metal Shaper. Self-contained, motor driven—it's far heavier and stronger than other shapers in its class—the most versatile machine of its size ever designed.

Roller chain and sprocket drive *plus* an extra-heavy cast iron crank pin plate gives a smooth, powerful "flywheel" action that reduces shock—preserves true work alignment—insures longer life—gives faster cutting—avoids gear backlash—keeps chatter to an absolute minimum.

Porter-Cable's exclusive Micro-set feature permits instant, accurate ram adjustment, saving costly set-up time. "Anyspeed" control regulates reciprocations anywhere from 64 to 175 strokes per minute without stopping the machine or shifting belts. Both tool head and vise are equipped with tapered locating pins. Six automatic cross feeds. Head turns full 360°. Table traverse, 10½". Vertical travel, 5½". Full line of accessories also available.

Ask your local Porter-Cable man (name in phone book) for full details, or write us direct TODAY for complete description of this new-principle machine, now "all ready to go" on war work.

PORTER-CABLE MACHINE CO.

1610-6 N. Salina Street, Syracuse, N. Y.
Representatives in all Principal Cities

AMES Shockless



Hundred Series
DIAL INDICATORS

For tough jobs, where hammer-like blows at the spindle end break down ordinary indicators, AMES Shockless Indicators stand up and give uninterrupted service. The addition of a simple shock-absorber to the wheel assembly protects the gear train without changing the outside dimensions or appearance. Unlike any other indicator cushioning device, it is absolutely effective, does not reduce accuracy or sensitivity and saves repair expense.

Try some of the various sizes and models on your most punishing testing jobs and see how they will keep on checking fractions of the thousandth inch just as accurately after being pounded and jolted severely.



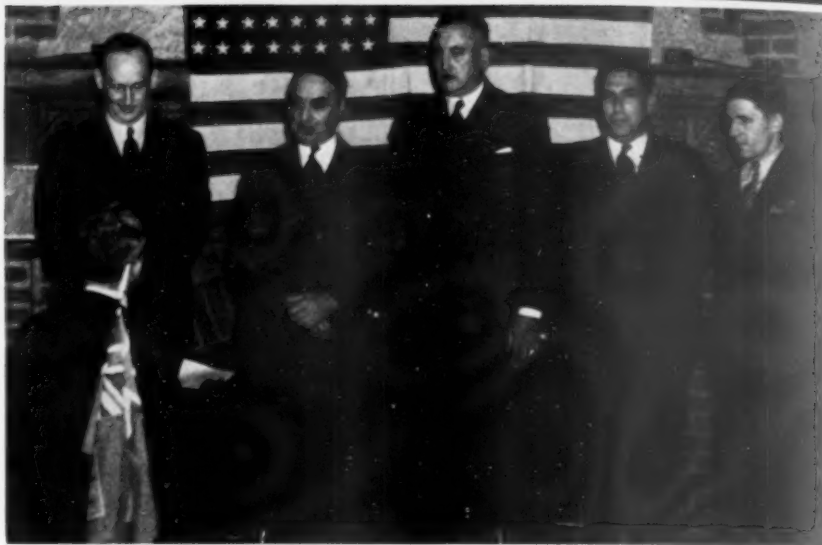
B. C. AMES CO.
WALTHAM, MASS.

—A.S.T.E. DOINGS—

to the Woodward Governor plant at Rockford. A chicken dinner was served in the cafeteria of the new plant to the Chapter members, which was followed by a tour of the factory.

Mr. Estell of the Woodward Governor Company and a member of the Rockford Chapter conducted the tour and explained interesting phases of the office, factory, and engineering arrangement.

The remainder of the evening was spent in the auditorium where movies on defense were shown.



Buffalo Chapter officers sworn in. Left to Right: Frank S. Mc Coy, secretary; Wm. J. Gamble Jr., chairman; Frank G. Schwenzer, 1st vice chairman; Frank M. Wilson, 2nd vice chairman; Al Kirchgessner, Treasurer.

MORE PRODUCTION

and lower unit cost with

SUTTON COLLETS

★
**Patented
DIAMOND
SERRATIONS**
... Grip tighter
... Self-cleaning

GRIP TIGHTER BECAUSE diamond serrations take horizontal and rotating thrusts at an angle with a wedge action. Repeated tests on a wide variety of work prove that diamond serrations hold work tighter with less chucking strain. This means: less wear on the collet—no spoilage from slipping—no marring of finished stock—heavier cuts without slipping—speed the machine cycle up to the limit of the tools.

SELF-CLEANING BECAUSE dirt, chips and scale work out more easily through diamond serrations, do not load up like ordinary rectangular serrations.

SUTTON TOOL COMPANY

2895 W. Grand Blvd. • Detroit, Michigan

COLLETS • FEEDERS

MASTER COLLETS AND PADS

MASTER FEEDERS AND PADS

PARTS AND ACCESSORIES
for lathes, milling machines,
hand and automatic
screw machines

SEE OUR REPRESENTATIVE

or send for Catalog No. 14A

SUTTON



COLLETS

St. Louis

The St. Louis Chapter held its monthly meeting on May 14th at the Hotel Melbourne. 300 members and guests were present to view the sound movie entitled "Chips" presented by the Warner & Swasey Co.

Mr. H. G. Riddle and Mr. R. Strawsberg, of the Educational Service Department of Warner & Swasey, presented the movie and lecture on the grinding of cutting tools.

San Diego

The San Diego Chapter met at the El Cortez Hotel, Friday evening, April 24th. 75 members were present.

Speaker of the evening was Mr. Arthur Denis, Tool Supervisor of the Criterion Tool Co. and a member of the Los Angeles Chapter. His subject was, "Production Tooling" and touched on the uses of different tool steels and their values.

At this meeting the 1942 officers were installed by Mr. A. Peck of the Los Angeles Chapter. The officers included Mr. J. J. Tucker of the Naval Air Station, Chairman; Mr. Walter Fritz, 1st Vice Chairman; Mr. Arthur Nordstrom, 2nd Vice Chairman; Mr. Ed Giesselman, 3rd Vice Chairman; Mr. R. J. Oertel, Secretary; and Mr. Grant Cline, Treasurer.

Syracuse

The Syracuse Chapter held its monthly meeting on May 12th at the Onondaga Hotel. Mr. Frommelt of Kearney-Trecker, gave a talk on plastics and their uses in the tool industry. His talk was augmented with slides on this subject.

Later in the meeting a technicolor sound movie of the Ready Tool and Die Head was shown.

The Syracuse Chapter voted at this meeting to buy three Government Defense Bonds at once.

Inspection of Production Is Vital

Use the Scherr Inspection Laboratory

Safeguard your production from the scrap pile. Machine tools may be speeded up, hours saved by better-set-ups, overtime and extra shifts may be installed. Yet this will be of no avail if your product is inaccurate, if rejections and disputes slow up production.



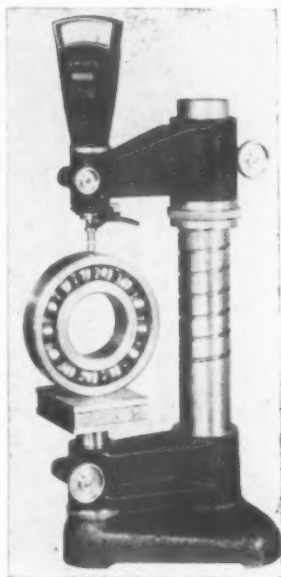
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The Wilder Projector enables you to see exactly where tools, templates, gages, threads, etc. vary from specified dimensions and contours and how much they are out. Magnifications from 10 x to 100 x. Base price, \$267.50 f.o.b. Waltham.

The Scherr Comparitol

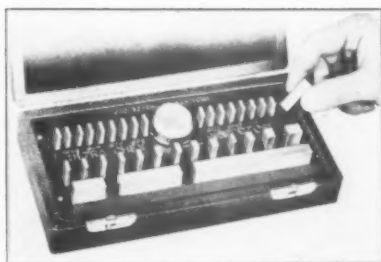
The Comparitol gives accurate, dependable readings in .0001" or .00005" and measures length, diameter, thickness, etc. Gage blocks, plug gages, tools, parts are checked for size, tolerance and wear. Mass produced parts such as bearings, pins, bushings, are rapidly inspected without dependence upon the skill or "feel" of the operator. Standard size, 0-6", \$195.00 f.o.b. New York; Heavy-Duty, 0-8", \$250.00 f.o.b. New York.

Illustrated is the Heavy-Duty COMPARITOL.



The Inspectoset

A set of gage blocks like the ULTRA-CHEX illustrated is a necessity to provide the basic standard of measurements from which all production starts and all measuring tools and gages used throughout the shop are checked and set. Large and small sets are provided. 34 block set, \$125.00 f.o.b. New York.

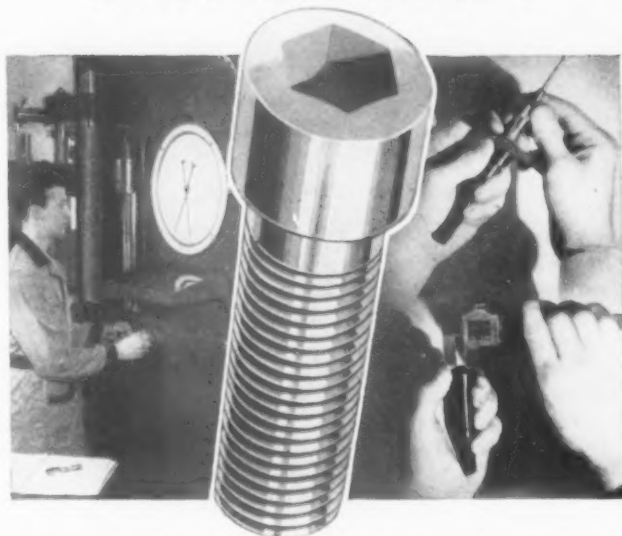


Write, wire or telephone Canal 6-1464 for quotation and delivery dates of the complete Scherr Limited Budget Inspection Laboratory.

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Every Parker-Kalon Socket Screw is quality-controlled by a unique routine that guarantees 100% dependability!

Physical and dimensional characteristics of Parker-Kalon Socket Screws are maintained well beyond generally accepted standards. Parker-Kalon's Quality-Control Laboratory - without counterpart in the screw-making industry - stands guard over every detail. "Doubtful screws" - screws that *look* all right but some of which fail to *work* right - are eliminated by a rigid, step-by-step check routine that begins with a careful analysis of the special alloy steel. This extra dependability is paying dividends to countless users who must today make every working-hour, every man-hour count. Yet, it costs no more to specify PARKER-KALON! Parker-Kalon Corp., 190-198 Varick St., New York, N. Y.



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Complete test and inspection routine covers: Chemical Analysis; Tensile and Torsional Strength; Ductility; Shock Resistance under Tension and Shear; Hardness; Head diameter, height and concentricity; Socket shape, size, depth and centrality; Class 3 Fit Threads; Clean-starting Threads.



PARKER-KALON

Quality-Controlled

SOCKET SCREWS

DoAll BAND FILES



Picture above was taken in a mid-western plant, where difficult production filing of machine gun stripper links and cartridge stops is done faster and better with DoAll Band Files.



● Since Pearl Harbor, DoAll Band Files, perfected long ago for high quality peacetime filing, are now on regular war schedules in hundreds of plants, turning out needed materials for army, navy and air corps.



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LIKE
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ON A
STEEL
TAPE
MAKE
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DoAll Band Files are 8 times as fast as hand filing, 5 times as fast as jig filing. Operating in one direction only, they last twice as long as 2-way stroke files.

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There are 23 sizes—a width, cut and style to take care of anything from high carbon steel to hard rubber.

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Associated with Continental Machines, Inc.,
Minneapolis, Minn.

A. S. T. E. DOINGS

Seattle

The Seattle Chapter held its May 12 meeting at Crawford's Grill. 65 Tool Engineers were present.

The speaker was Mr. Creighton Merrill of the Boeing Aircraft Company, Engineering Division, who showed slides illustrating the unusual methods of fabrication used in aircraft production.

The second half of the program was an interesting account of the experiences of Mr. Bob Crawford, who, as a representative of Boeing Aircraft, spent a year in England and Egypt with the RAF. His assignment was to familiarize the RAF with the Boeing Flying Fortresses and to aid in their maintenance problems.

South Bend

The latest methods of heat treating metals were described by J. C. Froblom, mechanical superintendent of the Lindberg Steel Treating Company of Chicago, in the regular meeting of the South Bend Chapter. This meeting was held May 12th in the Indiana Club.

Mr. Froblom's talk was followed by a movie on heat treating. More than 125 members attended this meeting.

Twin States (Springfield, Vermont)

Approximately 200 members and guests of the Twin State Chapter attended the meeting held in the Masonic Hall in Windsor, Vermont on May 13th. After the dinner, Mr. Aubrey Janion of Windsor, Vermont, gave a very excellent talk on the Hawaiian Islands. The technical speaker was Mr. Victor Ericson, grinding engineer of the Norton Company. Mr. Ericson showed slides which emphasized the value of a straight edge and high finish for cutting tools. This may be obtained by introducing an extra operation in grinding the tools whereby a polishing cut is taken. The speaker next showed a colored moving picture of the Norton Plant which showed the steps in the manufacture of abrasive wheels.

This was followed by the moving picture "Defense of America" which was prepared by the National Manufacturers' Association.

Springfield

The May meeting of the Springfield Chapter was held on the 11th at the Hotel Highland. About 90 attended the dinner and heard Mr. Dougherty, F.B.I. representative of Boston give a "Coffee Talk" on the past and present doings of the Bureau.

150 attended the technical session that followed. Past national president, Frank Curtis, introduced the main



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PORTABLE DUST COLLECTOR

An "Old English Sheep Dog" makes a good "portable dust collector" around the house, but for dust collecting in your factory, machine shop, etc., you need a **TORIT Dust Collector!** These efficient, self-contained units trap dust as it comes off grinding and buffing wheels. Yes—and they're portable too—easily moved wherever needed. TORIT Dust Collectors are "guardians" of employee health, "protectors" of vital machinery.

Write today for bulletin giving complete data, prices, and operating features.

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Dust Collectors
SELF-CONTAINED UNITS

THE TOOL ENGINEER



A Mark of Pioneership!



IN WORLD WAR I

Back in that hectic outbreak, when the need for unheard-of speed and accuracy fell upon industry almost over night, O K Tools were already there to meet it, and did so in an outstanding percent of the shops of the country.



IN THE DEPRESSION

When strict economy was the watchword of the hour, O K Tools, with the engineering service behind them, gave industry short cuts and improved methods which again and again turned loss into profit.



IN THE UPSWING

As the business curve began to climb and hope supplanted despair, it was to be expected that O K Tools would be relied upon by those in the know to maintain the upward pace.



IN THE "WAR OF SURVIVAL"

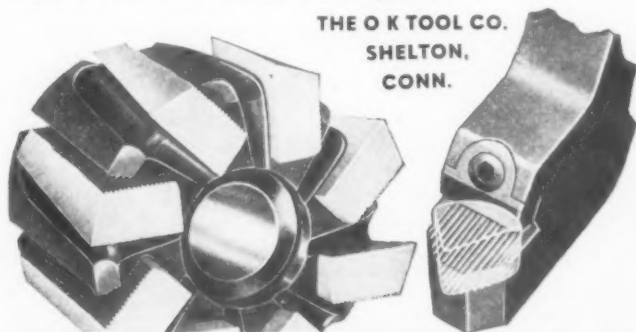
With such a background of approval, it is only natural now to see O K Tools accorded universal recognition in Defense plants, where they are speeding the production of every conceivable war product from fighter planes to heavy armament.



WHEN THE BLUEBIRDS RETURN

.... and industry can tool up for plowshares instead of swords, we'll be back shaking hands with our old friends, whose long-time recognition of O K Tools has made this business possible.

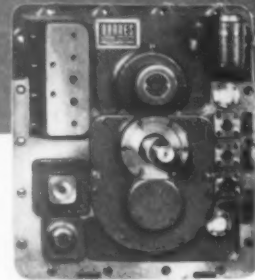
THE O K TOOL CO.
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SYSTEM
OF INSERTED-BLADE METAL CUTTING TOOLS

ANOTHER SIMPLE, FAST WAY TO DESIGN HYDRAULIC MACHINES

Barnes hydraulic panel assembly. Complete with pressure valve, pumps and piping for feed, traverse and a clamping unit.

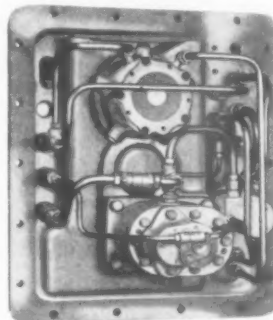


Provide Oil Reservoir in Machine Base and Use Barnes Hydraulic Panel

These Barnes panels can be furnished complete with all the hydraulic equipment necessary for efficient operation of the hydraulic machine. They may include, in various combinations, feed and traverse pumps, clamping pumps and valves. All piping, except to cylinders, is included in these compact units.

Save Design Time...Speed Delivery

Barnes hydraulic panels can be designed and built for control of elements and functions of milling, boring, grinding, drilling, and other metal working machines. They can also be furnished for operations of other machines whose functions can be controlled to better advantage hydraulically. The designing of the panels can be done simultaneously with your machine designing. In using Barnes hydraulic panels you can provide space in the machine base to serve as an oil reservoir and receive a complete hydraulic assembly, easy to mount and designed to meet the needs of your machine. Providing the oil reservoir, and piping to each cylinder constitutes your total hydraulic effort in machine designing.



Compact piping of panel shown above. All external piping connections are made on manifold at front side of panel.

For Complex and Simple Circuits

These standard hydraulic units are in use in mass production tools in all of our prominent automotive plants... in simple and complicated machining cycles. For additional data write for the booklet offered below.

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type Shavers, Coal Mining
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FREE New Data: Included in this 40 page book are typical installation circuits, complete data covering piston and gear pumps and complete information covering basic elements of construction and installation of standard units used in these highly successful hydraulic circuits. Write for your copy today. Ask for Bulletin T.E. 642.



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How **WALES** NOTCHING DIES Speed - up **PRODUCTION**

For rapid set-ups on T-slotted plates and press rails, the punch blade on Wales Punching Dies extends above holder to automatically guide the holder adjustment to the templet. Each individual notching die holder can be reset or removed instantly when changing patterns. Nothing is attached to the press ram.

Standard or irregular notching patterns can be notched in one stroke of the press. Self-contained holders maintain constant punch and die alignment.



Standard self-contained Wales Notching Die and Punch holder for speeding up usual and unusual notching operations. With several of these Notching Dies set up in series, metal parts can be completely notched with one stroke of press ram. Each individual notching die holder can be reset or removed instantly when changing pattern on T-slotted plate or rail.

Remember, there is always something new in the WALES LINE.
Keep posted by writing to—

THE STRIPPIT CORPORATION

BUFFALO, N. Y.
GEORGE F. WALES, President
Specialists in Punching and Notching Equipment

Ransome Welding Positioners in Victory Production

In many plants producing welded units for America's Victory, Ransome Positioners are saving untold production time. Properly holding intricate and often unwieldy parts, the machines bring the parts to convenient position for downhand welds, saving time and rod materials. Write for Bulletin 200-T.

Industrial Division

RANSOME CONCRETE MACHINERY COMPANY
Dunellen New Jersey



—A. S. T. E. DOINGS—

speaker for the evening, past national president A. H. d'Arcambal. Mr. d'Arcambal spoke on the subject, "Small Tool Conservation".

Toronto

The May 8th meeting of the Toronto Chapter was held at the Oak Room of the Union Station. 40 members were present for dinner and about 35 additional members came after dinner for the technical session.

The speaker for the evening was Dr. R. C. Jones of Research Enterprises Limited, Toronto, who spoke on the manufacture of optical glass, including the grinding, polishing and checking. His talk was illustrated with slides.

NOTICE TO CHAPTER EDITORIAL CHAIRMEN

All material for the Chapter Doings column should be addressed to A. E. Rylander, in care of THE TOOL ENGINEER, 2842 West Grand Blvd., Detroit, Michigan. To assure publication, all reports must be at the desk of Mr. Rylander by the 15th of the same month as the meeting.

Washington

The Potomac Chapter met at the American Legion Club on the night of May 7. About 68 attended the dinner and there were 80 at the technical session.

The speaker for the evening was Mr. J. T. Beard of the Socony-Vacuum Oil Company, Inc. Mr. Beard spoke on fluid cutting and soluble oils. His was an informative talk on the subject of cutting tools and was illustrated by slow motion pictures which showed the effects of working both brittle and plastic metals. This work was done once without the coolants and cutting oils and then with them. The operation was also done with different angles of rake.

This was followed by a sound movie entitled, "The Inside Story". This movie covered the broad subject of bearing, gear, and cylinder lubrication.

D. D. Burnside, national second vice-president was a guest at this meeting.

THE TOOL ENGINEER

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Flat and Special Shaped Springs

We are specialists in the making of instruments, fixtures and gages for the testing of springs.

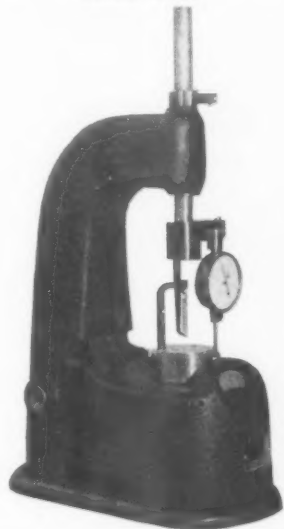
Model Illustrated is PB3-10-M with Dial Indicator Assembly and special removable fixture for tension springs

We make standard models of capacities from 0-10 lbs. to 0-1500 lbs.

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We make equipment for fatigue testing and aging springs.

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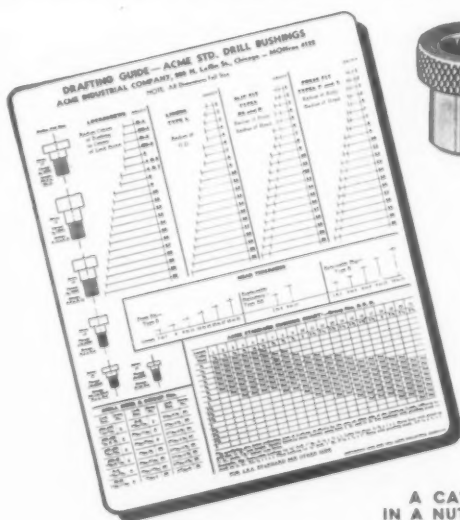
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a CAMPBELL ABRASIVE
CUTTING MACHINE may
solve YOUR cutting prob-
lems too . . .

For example, one CAMPBELL ABRASIVE CUTTER was designed, primarily, for cutting flat stock. Yet that same machine is doing these different jobs:

1. **Cutting Unusual Shapes**—Shapes of alloys and Stainless, annealed and unannealed—cut off square or at any desired angle.
2. **Cutting Slots**—Slot to predetermined depth.
3. **Reduces Cost of Cutting Boiler Plate**—Cuts so accurate and clean that it eliminates need for finishing operations usually required by other cutting methods.
4. **Cuts Hard and Soft Steel**—Cutting both hard and soft steel without changing the speed or type of wheel.

In the majority of the above, one clean, fast, accurate cut by the CAMPBELL ABRASIVE CUTTING MACHINE replaced several operations required by former methods.

It is now important to get every bit of production out of equipment, man hours and floor space. Ask for a Campbell Engineer to study your cutting problem. This involves no obligation and may prove much to your advantage.

Campbell  **ABRASIVE
CUTTING MACHINES**

ANDREW C. CAMPBELL DIVISION

In Business for Your Safety

AMERICAN CHAIN & CABLE COMPANY, Inc.

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DUBLIFE
PLUG GAGES LAST TWICE AS LONG
AS ORDINARY GAGES

"UPPCO FINISH"
ASSURES EXTREME HARDNESS
AND ACCURACY

The handle is made of hexagon material with bronze tapered collet which locks around the plug as it is driven into the handle. The plug are reversible, so that when one end is worn out the other end may be used, thus giving double life. 30,000 gages in stock ranging from .030" to 1".

ORIGINATORS
and exclusive manufacturers of **DUBLIFE GAGES** and **UPPCO FINISH**

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ALL DOWN-HAND WELDING WITH JUST ONE SET-UP



Photograph shows Model C-F Positioner with weldment tilted 135°.



Tilted at 135° (from horizontal) this circular weldment is being rotated at variable speed in a complete circle for down-hand welding. With push-button control in one hand and rod in the other, this welder has a "production-line" job—faster, safer, better welding on a C-F Positioner. You can speed up YOUR work on one of these machines which handle any size or shape up to 14,000 pounds.

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The Relationship Between the Shopman and Engineer*

By Harmon S. Hunt
Ford Instrument Co.
Long Island City, N. Y.

Many of the complaints by a Shopman regarding the particular engineer assigned to his department are justified. On the other hand, the Shopman may be responsible. To maintain the proper balance, there should be the important element of psychological understanding with the executives of an organization in order that harmony may abound.

In the first place, we all must acknowledge that there are many different types of persons in this world, each having his own idiosyncracies and accomplishments . . .

In the second place, the management must be sincere, must show no partiality and must recognize good work done . . .

Politics or favoritism may be prevalent but, regardless of it, production must go on.

It generally falls to the lot of the shopman and engineer, to bring the product to a saleable condition. Which should have the honors for the accomplishments? In true teamwork, the honor is equally divided. Each does his own particular task and does not waste his time trying to do the work for which someone else is responsible.

Consider the intended reasons for each man's existence in any organization. In general, what does the shopman have to do?

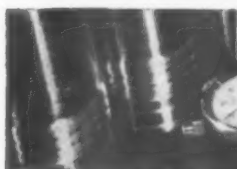
First of all, his prime importance is to produce material, or see to it that his department produces the products schedule to be made in his particular orbit. If it happens that the organization is a small one, he is, undoubtedly responsible for other things besides production. He may also be required to determine the way jobs are to be done and what equipment is necessary to accomplish the various tasks. In a small organization, he must be an all-around man with a considerable amount of experience to fit him for these tasks. In such a capacity, he thinks usually in terms of relatively small quantity production and simplified means of accomplishing the varied tasks. He *must* have a broad background to do this job well. He is in one sense, a shopman and an engineer rolled into one.

Why then do we need an engineer? What are his merits? How may he justify his existence?—Webster says, "An engineer is one who is skilled in the principles or practices of any of the branches of engineering; One who car-

*A condensation from *The Monthly Review of the American Electroplater's Society* for March, 1942.



ON THE NOSE!



Since Taft-Peirce first provided the gages for the original educational shell orders, the capacity of the Taft-Peirce Gage Division has doubled, redoubled, and still continues to grow. Today, throughout the defense industries, costly errors are being avoided, precious time is being saved, accurate size-control of production is being maintained with Taft-Peirce Gages and Gaging Fixtures. One of the few complete gaging systems, the Taft-Peirce line includes all standard types. Any special types may be produced as ordered. For the full picture, write on your letterhead for a copy of the Taft-Peirce Handbook.

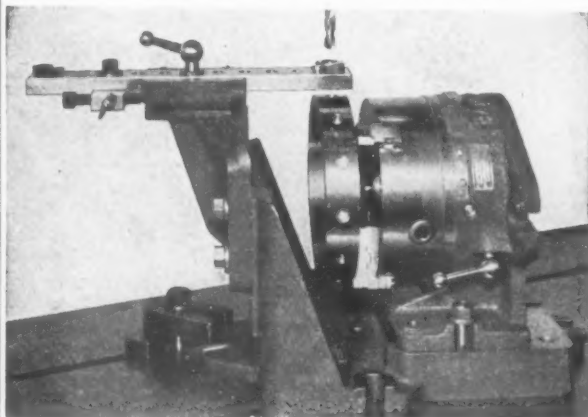


The Taft-Peirce Mfg. Co., Woonsocket, R. I.

ACCURATE DRILLING

with the

HARTFORD "Super Spacer"



Pictured above is the "Super Spacer" being used in a drilling operation. To increase the range of jobs possible, a supplemental base is furnished (optional) as shown above. Variations of diameter and length in radial drilling can be easily handled. Set up time is negligible.

**Also Applicable to GRINDING • MILLING •
JIG BORING • PLANING • SLOTTING •**

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HARTFORD, CONN.

JUNE, 1942

All-Out WAR PRODUCTION NEEDS THIS PROTECTION . . .

Against DELAYS, SABOTAGE, FIRE,
WATER and ACCIDENT HAZARDS



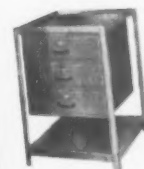
Work Bench with
3-Shift Insert



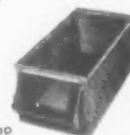
Stools



Machine Tool
Unit



Shop
Boxes



Bench
Legs

Tool Stand with
3-Shift Insert



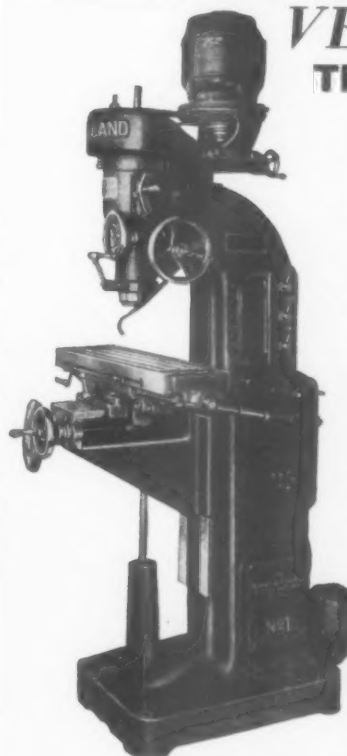
Foreman's Desk
with 2-Shift Insert

• Lyon Shop Equipment accelerates production by helping workers make efficient use of every machine, every square foot of floor space, and every minute. It guards against hazards that cause costly delays . . . and might necessitate complete shut-downs. Write for catalog.

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VERSATILE! The CLEVELAND No. 1



Designed to meet the steadily growing demand. This small, rigid, high-speed vertical spindle Milling Machine embodies all essential features required by the modern tool room, die and mold shop, and production plants. In addition, the new CLEVELAND is equally adaptable to heavy duty continuous production.

It is a completely new machine, designed and built with all these requirements in mind, by a company whose principal business for 20 years has been creating special machines for the high production industries.

Longitudinal feed is 18"; cross travel, 8 1/2" and vertical travel, 16". The table has a working surface 8" by 32". Two optional ranges of 12 spindle speeds each are offered, from 100 to 1750 r.p.m. or 200 to 3475 r.p.m.

VERTICAL MILLING MACHINE

For further information write for new Bulletin

The SOMMER & ADAMS Company
CLEVELAND • • • OHIO, U.S.A.

LUFKIN TELESCOPING GAGE

IT'S ACCURATE

IT'S HANDY

IT'S QUICK



Here's the tool for quickly and accurately measuring inside diameters within less than a thousandth of an inch. Plungers, under constant spring pressure, can be locked by slight turn of end of knurled handle. Handle can be locked in center of plungers, assuring perfect balance, an exclusive Lufkin feature. See this gage at your dealers and write for catalog of Lufkin Tapes, Rules, Precision Tools.

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LUFKIN

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TAPES • RULES • PRECISION TOOLS

ries through a scheme or undertaking by skill or astuteness; One who is mentally quick and discerning." Generally speaking, the engineer, in a small organization, is a trouble-shooter. In the larger organizations, he is a specialist.

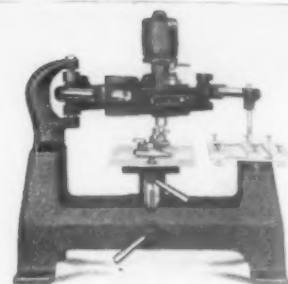
Having classified both men, let us get back to a shopman who is suddenly pressed for much greater production. More help is hired. With this comes the added job training. He cannot now give his proper attention to such things as figuring out methods to do the new jobs, work out new processes for the increases of out-put, change the floor layout to make room for new equipment required, trace why certain jobs are consistently being returned from the inspection department with too high a percentage loss, etc.

With this added available work at hand, there is a call for the division of responsibilities and some degree of specialization so that the program may not be held up. The shopman should take over the responsibility for the production and the training of employed help. The engineer should take care of the remaining responsibilities in order to facilitate the flow of work. Now if these tasks are too varied and voluminous, they may be divided still further. The methods and Tool Engineers may take over the tooling for the processes or the expansion of production. The production engineer may work into the picture with scheduling, floor-planning for better flow of production, or even, the purchase of new equipment...

What invokes these frictions between men who, each in his own field, is well-rated? Unfortunately, there are human characteristics which mar good team work in the shop regardless of qualifications. May you be reminded that it isn't all one sided. What applies to the engineer also applies to the shopman. The fruits of character training back in the home where early training meant so much, generally reflect in mature ages. A portrayal of several types of persons will bear out this contention.

There is the "I am" person, who believes that he alone knows everything and because he is in that category, his opinions should be accepted without dispute. Now—it is a fine thing to believe in one's self, for without this confidence, one would never succeed. However, with an over-emphasis of this trait, it sometimes is impossible to swallow one's pride and to admit an error. It is generally this fact alone that leads to downfall. The error committed is never half so bad as the refusal to acknowledge its responsibility.

Then, there is the "Two Timer" personality. One who gets into the habit of acting as a parasite and who gains ground or holds his own only at the expense of some one else. Usually an in-



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ACID ETCHING,
ELECTRIC MARKING

... All three with
one machine

A compact precision bench-type pantographic machine, with interchangeable heads... for engraving instrument dials, name plates, etc... and for acid etching or electrically marking tools and parts—heat-treated or annealed—on flat, concave, or convex surfaces.

Illustration shows machine with engraving head attached.

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161C SUMMIT ST. NEWARK, NEW JERSEY

FORMING without DIES!



Are you in a rush for some duplicated metal parts? Do you have experimental work? In many cases you can make the parts faster with the "Di-Acro" System, and avoid entirely the expense and delay of making dies. An almost unlimited variety of work can be rapidly done by the combined use of 3 Di-Acro Precision Units,—Shear, Brake, Bender.

Di-Acro Brake No. 1 (shown above) rapidly forms angles, channels, "Vees". Folding width 6". Brake No. 2, folding width, 12". Accurate to .001".



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New 32-page catalog "Metal Duplicating Without Dies" gives full details, shows many parts which can be made.

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ARMSTRONG

LATHE AND MILLING MACHINE DOGS



Because they are correctly designed and balanced and are drop forged from tough open hearth steel, heat treated to extreme stiffness . . . because they have alloy steel screws that are hardened at the point to prevent up-setting, and have

oversize hubs that permit retapping . . . ARMSTRONG Drop Forged Lathe and Milling Machine Dogs **have double life** . . . are universally recognized as the finest obtainable. 11 types, all sizes. Write for Catalog.



ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

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Seasoned travelers, when they visit Detroit, most always stop at the hotel that's "Aglow with Friendliness." They appreciate the extra value they get for every dollar they spend.

900 rooms with bath, circulating ice water and Servidor from \$2.50.

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Aglow with Friendliness

J. E. FRAWLEY, General Manager

JUNE, 1942

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- TO SEASON DIE SETS
- TO IMPROVE CHILL SHRINK FITS



THE NEW REVCO TOOL ROOM CHILL CHEST

In this compact and sturdy chill chest Revco offers tool accuracy and precision insurance. For use in both large and small tool shops this chest makes possible the latest methods of tool treatment.

Investigate this Revco chill chest today.
REVCO, INC., Adrian, Michigan

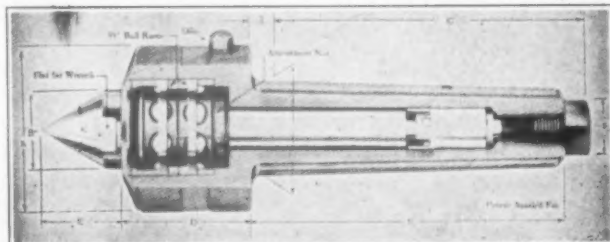
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LOAD CAPACITY—200 TO 40,000 LBS.
AT 100 RPM.

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Built for
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Unmatched per-
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difficult sawing
and filing of tools,
dies and miscella-
neous parts . . .

Write or wire for
details and prices

GROB BROTHERS
GRAFTON WISCONSIN

feriority complex in this type of fellow has been the result of his initial back-ground. He is the well known type who is to all appearances trying to be co-operative—but at the same time, is gaining information regarding his assignment from some one who knows. He then uses this information and turns it in as the fruits of his own labors. Usually, this type will disrupt all efforts and advancement made for true cooperation in an organization.

There is another type well known to all of us, namely the "Aggressive Type." He is one so full of energy that he cannot be satisfied with the tasks that normally confront him. He is constantly looking for better ways to do things. He is not satisfied with "good-enough" or "will-do-for-now" ways. However, he is very apt to unconsciously ignore those around him since he is so wrapped-up in his own sphere of endeavor. This may cause a handicap in the form of jealousy among his fellow workers who may feel that his high plane of endeavor belittles their normally good performance.

Last, but not the least, is the "Rear-Guard" type of fellow. He takes everything in a normal stride. He doesn't become excited easily and always has a steady plod. He can always be depended upon to supply answers in a pinch. He is always willing to help all comers and takes pride in being helpful to everyone. He is the salt or the stabilizer of any organization.

You can probably look about you and identify most of your fellow-workers, as belonging to one of these types. You might well try to analyze yourself in the attempt at self-improvement.

Milling Machine Company Announces New Direct Field Engineering Offices

The Cincinnati Milling Machine Co., manufacturers of Milling, Broaching and Cutter Sharpening Machines, and Cincinnati Grinders Incorporated, manufacturers of Grinding and Lapping Machines, will on June 1st serve their customers in New York State and New England through their sales subsidiary, Cincinnati Milling and Grinding Machines, Inc., with district offices located in New York, Hartford, Boston, Buffalo and Syracuse. A staff of field engineers, service men and demonstrators, long technically trained and thoroughly experienced in milling, broaching, cutter sharpening, grinding and lapping methods, will provide prompt and effective service to the manufacturing industries in these areas.

Henry Prentiss & Co., Inc., who have acted as the companies' exclusive dealer in New York State and New England since 1887, have announced their retirement from active business on May 31st.

MULTI-UNIT DRILLING MACHINES

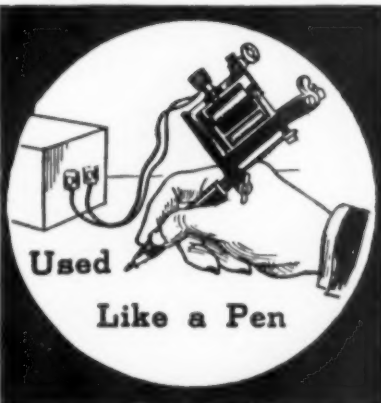


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CENTRIFUGAL FEED DRILLING UNITS

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WILL DO THAT MARKING JOB
ENGRAVES WOOD, PLASTICS,
GLASS, ALL METALS, INCLUSIVE

HARDEST STEEL

WORKS FROM 110-120v 50-60 CYCLE, A.C.
THROUGH A SPECIAL TRANSFORMER
COMPLETE OUTFIT\$22.50

ORDER NOW ON 10 DAY TRIAL
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QUICK DELIVERY ON RATED ORDERS

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The ONLY Boring
Bar with the
economical tri-
angular bit.

Designed to use a larger bar diameter as the bit cuts ahead of the bar. This insures rigidity, making higher boring speeds and heavier cuts possible.

Everede Boring Bars are made of the finest heat treated nickel steel and each bar is furnished with six triangular high speed steel bits.

The Everede Boring Bar also permits the use of a solid stellite or carbide tool bit by clamping the bit in the "V" Type grip holding it firmly without danger of breakage.

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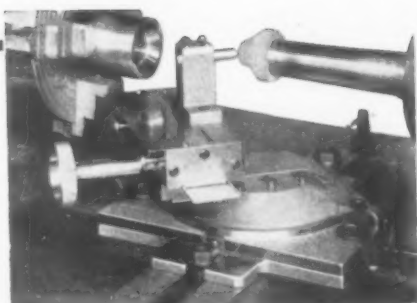
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WILLIS STUTSON

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Angle Tangent
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DRESSER**



**Meets Every Forming Requirement For
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● The Vinco Dresser is universal in its application. Diamond posts are interchangeable. This permits its use on your external, internal, cutter and surface grinders. Illustrated is its use on a Heald Internal grinder.

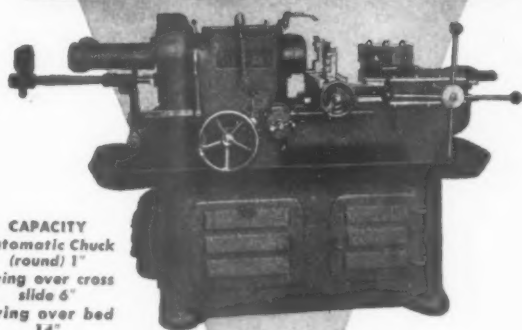
It provides the fastest, most accurate method of dressing radii, angles, and angles tangent to radii. All operations are performed from the same axis without the necessity of moving the diamond. Dressing accuracy is guaranteed to within .0001". Write for full details.

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The MOREY 2G
Back-Geared
TURRET LATHE
Timken Bearing
Self-Locking Turret and Infinite Spindle Speeds



CAPACITY
Automatic Chuck
(round) 1"
Swing over cross
slide 6"
Swing over bed
14"

Thousands of the MOREY 2G Turret Lathes are saving money with no sacrifice of high speed production. Economy features: Back Gears are instantly thrown in through extra large Twin Disc Clutch—Full advantage from high speed and carbide tools—Vibrationless precision and an infinite variety of spindle speeds for every job—Timken bearing—Self-locking turret. Can be furnished with tooling.

Ask for Circular 629 for full details

MOREY MACHINERY CO., INC
410 BROOME STREET • NEW YORK, N. Y.

JUNE, 1942

DIA-TOOL INC.



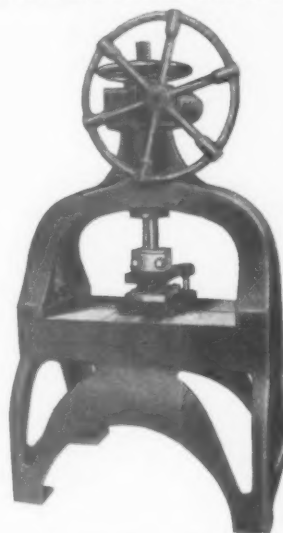
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ASK FOR NEW 16 PAGE BOOKLET
AND PRICE LIST

320 YONKERS AVENUE, YONKERS, N. Y.

PRODUCTO UTILITY PRESS

An Indispensable Machine!
for any Tool Room or Machine Shop

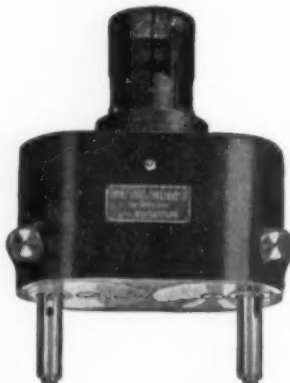


This handy machine has many general uses: For shearing punches and dies in the tool room; For separating punch and die holders on large liner pin die sets; For assembling and aligning of punches and dies; For use as a straightening press; and for use as an arbor press. Ask for circular No. 312.

Write for complete details

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U S HEADS STANDARD SINCE 1915

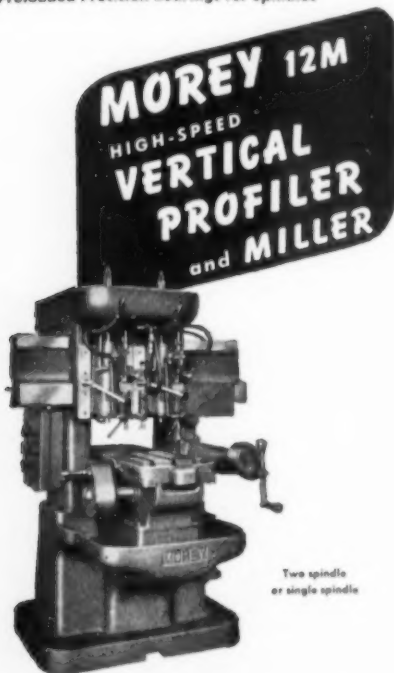


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ADJUSTABLE DRILL HEADS,
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Preloaded Precision Bearings for Spindles



Two spindle
or single spindle

Speed and more speed in the production of interchangeable parts requiring milling of any contour or outline is yours in the MOREY 12M. Provision for increased clearance between spindles and table.

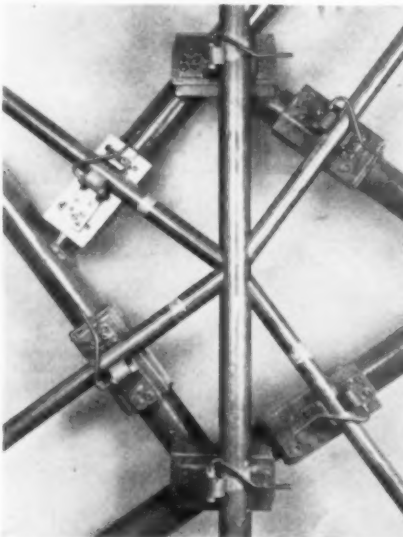
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MOREY MACHINERY CO., INC.
410 Broome Street New York, N. Y.



400% Labor Saving Tool Produced at 50% of Cost

A rollover clamp used by a large airplane factory has been designed to cut down time needed to clamp various sizes of tubes in jigs for welding. The conventional hook-and-wing-nut clamp was used before adoption of this device. Time and motion study revealed that the wing-nut type required an average of five separate movements to clamp and three movements to release — a total of eight movements. The roll-over type required but three movements to clamp and two to release — five separate movements.



Roll-over clamp as used to hold tubing reading for welding. See drawing—page 164.

The average time required for the clamping and release of each roll-over clamp was 1.53 seconds, and the average required for the wing-nut clamp was 6.28 seconds. The labor saving, resulting from fewer and simpler movements, was 413%.

The roll-over clamps can be produced at the rate of three an hour. Wing-nut types are produced at the rate of one and one-half an hour. The

SAFETY (Reg. Trade Mark) WEDGE GRIP RADIUS HOLDER



For marking around circumference of shell forgings, bars, tubes, and other round pieces. Adjustable for stamping on different size radii. Safety Steel construction eliminates spalling and mushrooming.

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Pyott Multiple V-Belt Drives conform to all the engineering specifications established by Multiple V-Belt Drive Association.



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SPEED UP

WITH
ACCURATE • SPEEDY
FLEXIBLE

DESPATCH FURNACES

TOOLS • DIES • PRECISION PARTS

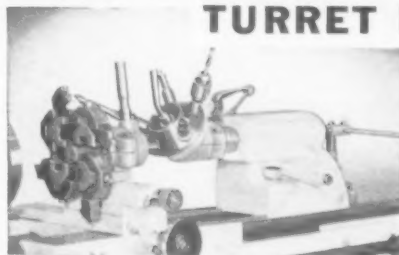
For heat treating tools, dies, precision parts, non-ferrous castings, aluminum forgings and rivets, etc., for production, maintenance or laboratory use, Despatch CF Furnaces eliminate heat treating bottlenecks. They are flexible to suit the temperature needed almost at a moment's notice. Accurate and uniform within $\pm 5^\circ\text{F}$. for all precision work. Speedy with fast heat transfer and sufficient force to penetrate either a dense or coarse load in short time. WRITE TODAY for full information given in Bulletin 83, or request a Despatch Engineer to advise the furnace for your plant. No obligation.

DESPATCH

OVEN COMPANY MINNEAPOLIS MINNESOTA

JUNE, 1942

DON'T WAIT FOR TURRET LATHES

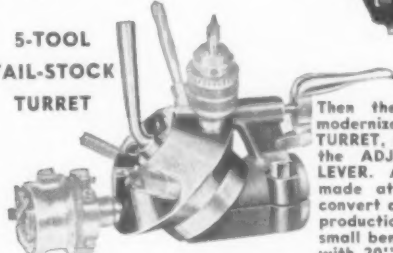


Convert Your
ENGINE LATHE
into a
TURRET LATHE
in
15 Seconds

Photo Shows Turrets on 16" Lathe

This new modern TOOL-POST TURRET, made in 2 sizes, designed to increase production on engine lathes. Easily mounted on cross slide or compound rest. Has capacity of 4 standard made tool holders which can be easily inserted and rigidly held.

5-TOOL TAIL-STOCK TURRET



4-TOOL TOOL POST TURRET

Then there's the completely modernized 5 Tool TAIL-STOCK TURRET, made in 4 sizes. Also the ADJUSTABLE PULL-FEED LEVER. All tools are precision made attachments which will convert any engine lathe into a production turret lathe. To fit small bench lathes up to lathes with 20" swing.

Write for bulletin of these and other JEFFERSON TOOLS.

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FAST PRODUCTION REQUIRES AN EFFECTIVE COOLANT SUPPLY FOR YOUR HARD-PRESSED MACHINES

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Geared - Vane - Centrifugal

Write for Catalog showing a wide range of sizes for various applications.

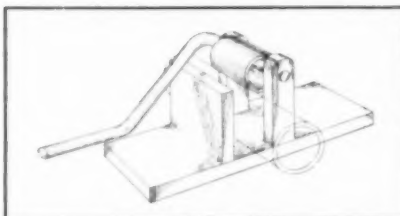
BROWN & SHARPE MFG. CO.
Providence, R. I., U. S. A.



BROWN & SHARPE PUMPS

The roll-over clamp has been standardized for various sizes of tubing, ranging from $\frac{1}{2}$ to $1\frac{3}{4}$ inches in diameter. The eccentrically mounted piece of tubing remains standard in size (1-inch), and the free space between the support and the backing is varied to take different sizes of tubing. Base, handle, and uprights are

all cold-rolled steel, and the section of tubing in .065 4130 steel. The struc-



Roll-over clamp used in aircraft assembly. Saves 400% man-hours over previous device. Costs half as much. Structure is all-welded.

ture is welded throughout; the eccentric tube is welded to the handle on assembly.

The new device clamps positively, yet has sufficient spring to permit welding shrinkage. Its quarter-inch base can be placed in positions inaccessible to many clamps; the base may be cut to suit its location. It can be welded or fabricated in place—whichever method is the most suitable.

Since the tube used in the clamp may be the same wall thickness as the tubing it is to hold, the possibility of deformation of the tubing through crushing is eliminated.

*Submitted by C. A. Burnham
Wichita, Kansas.*

Re-Drawing of Shells of Cups by the Inside-out Process

The shell or cup is blanked and drawn in a conventional double-action press. Instead of reducing the diameter of the drawn cup in the conventional way by pushing the cup through successive dies that are anywhere from 15% to 22% smaller than the preceding dies, we turn the cup inside-out to reduce the diameter. By this latter method we are able to reduce the diameter of the cup from one operation to another by 25% to 35%.

The accompanying sketches show a typical job where this method is being used to advantage. Figure No. 1 shows the shell as it comes from a conventional double-action press. In this case the material is .062" Cold Rolled Steel, and the blank diameter is $11\frac{1}{8}$ ". The O.D. of the drawn shell is $6\frac{1}{4}$ "; this is a reduction of 44% from the blank diameter. Figure No. 2 shows the shell after it has been redrawn by the inside out method to its finished size. The shell now measures $4\frac{5}{8}$ " O.D. which is a reduction of 26% from the previous

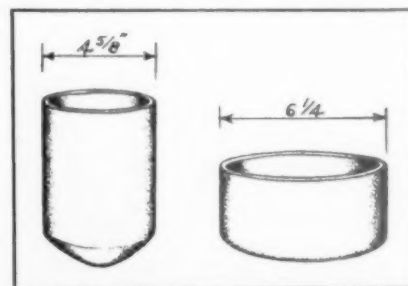


Figure 1, left, shows shell as it comes from conventional double action press. Figure 2, right, shows shell re-drawn by inside-out method.

TABLE OF BRONZE SPECIFICATIONS TO GOVERNMENT REQUIREMENTS		REMARKS
1	2	3

TABLE OF BRONZE SPECIFICATIONS TO GOVERNMENT REQUIREMENTS

The following tabulation of Specifications shows in parallel the relation of Ampco Metal and Ampco-made bronzes to specifications issued by various governmental agencies and independent organizations. The production of these alloys is an every-day occurrence at the Ampco foundries.

	A.R.E.	A.S.T.M.	AMPCO	CHEMICAL COMPOSITION	REMARKS
				Fe 75-85 Al 9.0-10 ***	Rolls, high iron type aluminum bronze

TABLE OF BRONZES

The following tabulation of Specifications issued by various governing organizations. The production of these alloys is an every-day occurrence at Ampco.

FEDERAL	NAVY	AIRCORPS	AMS	A.A.E.	ASTM	AMPCO	CHEMICAL COMPOSITION	REMARKS
QQ-B-666 Grade B	46-B-17b Grade B		4635	701		Ampco 16	Fe 2.75-3.5 Al 9.0-10	Rollled, high iron type, aluminum bronze
QQ-B-671a Class A	46-B-18c							
QQ-B-677 Class								

Bronzes to Government Specifications

FEDERAL	NAVY	AIRCORPS	AMS	A.A.E.	ASTM	AMPCO	CHEMICAL COMPOSITION	REMARKS
QQ-B-666 Grade B	46-B-17b Grade B		4635	701		Ampco 16	Fe 2.75-3.5 Al 9.0-10	Rollled, high iron type, aluminum bronze
QQ-B-671a Class A	46-B-18c							
QQ-B-677 Class								

AMPCO PRODUCES ESSENTIAL BRONZES

Bronzes to Government Specifications

**AMPCO PRODUCES
ESSENTIAL BRONZES**

Government contractors, needing bronzes for war production service, will find at the Ampco foundries full facilities for producing bronzes to meet the exacting specifications of the Army, Navy and Air Corps.

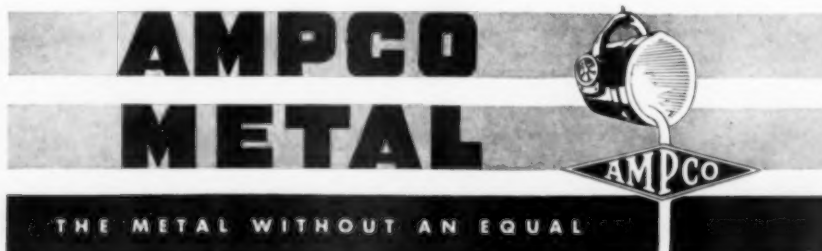
The wide experience of our engineers and metallurgists, plus modern foundry equipment, assures alloys that meet rigid specifications. All alloys are laboratory controlled.

If your sources of bronzes are inadequate—if you need alloys on a production basis—ask for our "Table of Bronze Specifications to Government Requirement" which lists bronzes constantly produced at Ampco correlating them with governmental specification numbers. Free on request.

AMPCO METAL, INC.

DEPARTMENT TE-6

MILWAUKEE, WISCONSIN



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TRIPLE DUTY

Three Interchangeable Center Pieces (illustrated below) for all kinds of centered and uncentered work. Save set-up time.



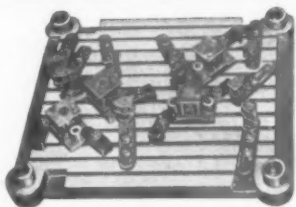
OTHER PRODUCTION SPEEDERS



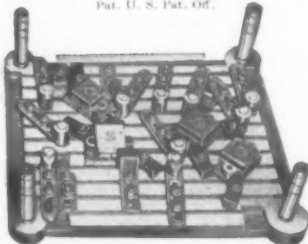
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Measured by the number of times they can be used, De-Sta-Co Spacers are the lowest in cost of any spacers you can buy. Made of metal, they are not affected by oil or heat. Use these spacers for quick set-up of milling machine cutters and wherever low cost, accurate spacing is required.

Stock sizes .001" to .125" thick. Specials, any length, cut from bar stock, ground to decimal.

TRIAL ASSORTMENT—enough for average use on one machine sent for \$1.00. Give arbor size. Size and price list sent FREE!

DETROIT STAMPING CO.
Established Over 25 Years
356 Midland Ave • Detroit, Mich.

operation. Figure No. 3 shows the shell in the process of being redrawn, together with the essential parts of the redraw tool, which are the die, the punch, and the hold-down plate.

The die is made of cold drawn steel tubing, turned to whatever size is desired. It is then carburized and pack-hardened so as to get a case of approximately 1/32" to 1/16". After hardening, the die is ground to size and chrome plated. We have found

that chrome plating is not absolutely necessary, but it helps to prolong the life of the die. The punch is of a conventional style, and the tool can be made so that the shell can be drawn straight thru, or the bottom can be formed and the shell pushed back up thru the die. One of the most essential parts of the tool is the hold-down. This part can be made of either hardened tool steel or machinery steel pack-hardened. The hold-down prevents any wrinkles from starting when the shell is being

drawn, and must therefore be very hard and smooth, and preferably chrome plated.

The inside-out operation is most successful if done in a double-action

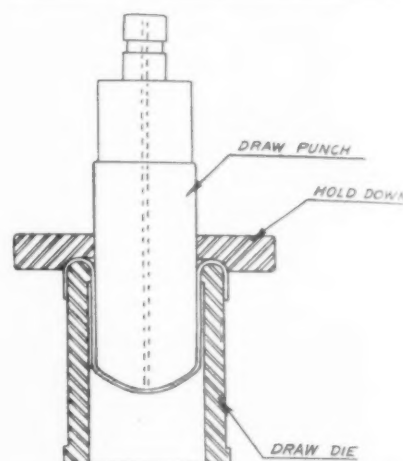


Figure 3

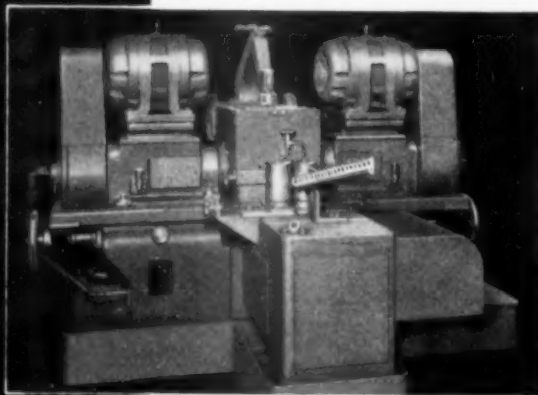
What's YOUR grinding job— *parallel-surface parts like this?*



IF SO, you should investigate the possibilities of Gardner DOUBLE-DISC Grinding.

For example, the steel thrust washers having parallel faces of UNEQUAL area, shown here, are ground, two sides simultaneously, on a Gardner No. 120A-23" Double Spindle Grinder, using a "push-thru" fixture with a rubber-roll feeding attachment. The parts are supported, during grinding, on steel guide bars which extend through the machine between the abrasives, and are fed in a constant stream, dropping out at the rear. Ample coolant is used, and excellent finish and accuracy are obtained.

PRODUCTION, on washers approximately 2" O.D. x 1 1/4" center hole, averages 30 per minute, holding within .001" for flatness and parallelism, and .002" for uniformity.



Gardner Double-Head Grinders, carrying heavy-duty WIRE-LOK Abrasives (see illustration below), will turn out YOUR parallel-surface jobs with similar results.

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on
DOUBLE-DISC
GRINDING!



GARDNER MACHINE CO.

442 East Gardner St., Beloit, Wisconsin, U. S. A.

"Gardner—Grind Your Flat Surfaces"

drawing press, because the hold-down can then be adjusted to a predetermined setting so as to allow the stock to flow freely, yet not wrinkle. The press operator takes the shell as it comes from the blank and draw operation, and places the shell upside down over the die which looks like a tube with a true radius on the end. He then trips the press; the outside slide of the press, which holds the hold-down comes down to a predetermined setting and stops; while the inside slide of the press carrying the punch comes down and pushes on the bottom of the shell, forcing the shell to go down into the inside of the tube which is the die.

Naturally the stock hardens up, due to the severe punishment that it receives. The material in the flat sheet has a Rockwell reading of B-45 to B-50, whereas after the blank and draw, and the inside-out operations, the shell shows a Rockwell of B-90 to B-95. No annealing is necessary on the shell shown in the sketch, but it is necessary to machine square the top edge after drawing, to prevent season-cracks from developing. If, however, it should be desirable to further reduce the diameter of the shell, it would be necessary to anneal it, after the first inside-out operation. The shell can then again be redrawn by the inside-out method, after annealing.

The advantages in using this

THE TOOL ENGINEER

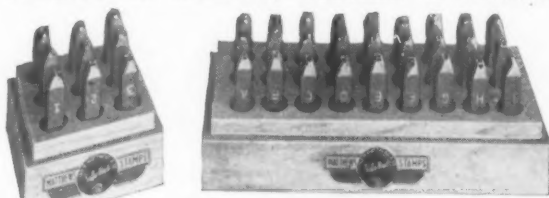


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"Safe-Hed" — "Tuf-Face" — Steel Stamps can be used for 90% of all stamping required in the production of War materials, armor plate, etc. Body size is made adequate for the application. Contour of head minimizes danger of chipping or mushrooming. Order a set today, and discover the tough, durable quality of these stamps.

SUPPLIED IN LETTERS, FIGURES or SYMBOLS



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- Effortless feeding instead of full strength pressure.
- Rapid, smooth and accurate cutting.
- Life that is at least seven times that of the old type counterbore.

PUTNAM TOOL COMPANY

2987 Charlevoix Ave. • Detroit, Michigan

JUNE, 1942

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from

RED-E HIGH SPEED CENTERS



High speed steel is superior for the bearing point of a center, because it will withstand the heat generated by friction between the work and center, and will not break down or lose its temper with hard work and high speed.

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Reclinable POWER PRESSES



This press has long been considered the most suitable and favored type for general stamping work. Its features have been standard for a number of years, but many important improvements in details make the latest model outstanding. Its high performance is the result of thorough research, sound engineering and careful designing.

The Type 36 Press is available either plain or back geared, and the models range from 4 to 100 tons capacity.

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ZEH & HAHNEMANN CO.

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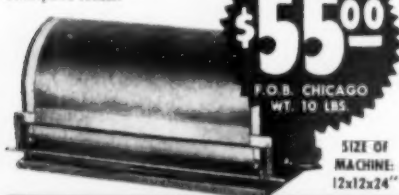
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10 x 36" Landis Hydraulic, M.D.
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Sidney 16" x 8" M.D.
Sundstrand 8" Stub, M.D.
Rahn & Lamson 18" x 8" c/shaft

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No. 2 1/2 Hendey Production
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PRESSES

No. 34 Toledo Solid Back, Geared
No. 2, 3, 4 Farracute Solid Back
No. 14 & 14 1/2 Toledo Honing, M.D.
No. 6 Minster, O. B. & M.D.

Planers, Shapers, Shears, Etc.

MACHINE TOOLS POWER PRESSES



546 Second Ave. Detroit, Mich.

168

—THE CRIB—Cont'd—

method of redrawing shells or cups is not only eliminating an operation in the drawing process by being able to effect greater percentages of reductions in each redraw operation, but in many cases it saves an annealing and the necessary pickling that follows the annealing operation. There is also the advantage that if score marks or draw lines develop in the first operation, they will be on the inside after the inside-out operation.

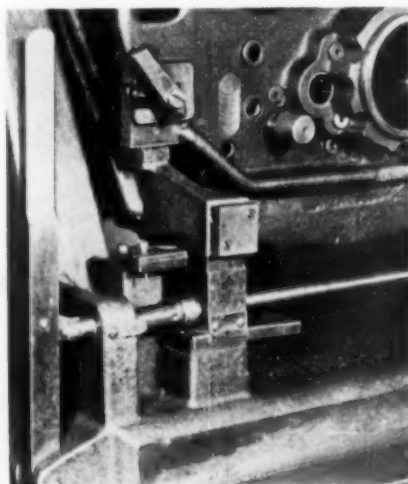
Carl E. Johnson
Chief Engineer
Larson Tool & Stamping Co.
Attleboro, Mass.

Do You Have an Idea For THE CRIB ? ? ?

THE TOOL ENGINEER will pay \$5.00 for your kinks or shop shortcuts published in this column. Brief, practical articles should be accompanied by sketches or photos.

Trunnion Drill Jig

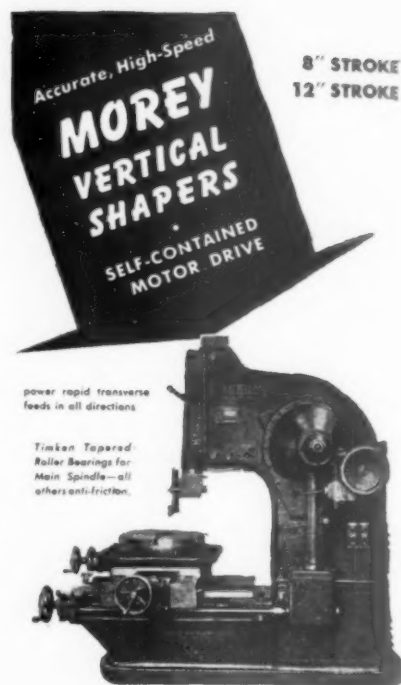
Seventy holes, measuring from 1/8-inch to 3.125-inch diameter are machined in this jig built by Scott and Williams Knitting Machine Company for work in their own shop. Important holes are located to the required dimensions within .001-inch tolerance.



Close-up showing special features of trunnion drill jig. Picture of complete fixture on page 176.

The hardened renewable support blocks are carried on a sliding shaft and support the jig well beyond the point where the pressure is applied.

(Continued on page 176)



power rapid transverse feeds in all directions

Timken Tapered Roller Bearings for Main Spindle—all others anti-friction.

Built to highest accuracy standards the MOREY VERTICAL SHAPER is simple for tool-room manufacturing. Power feeds and power rapid transverse feeds in all directions are instantly available in all operating positions.

Ask for Circular 726

MOREY MACHINERY CO., INC.
410 Broome Street New York, N. Y.



DANLY Precision DOWEL PINS

All Die Makers' Supplies

Danly Precision Dowel Pins

Danly Commercial Sets

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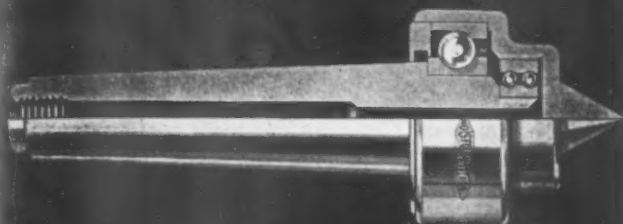
DANLY PRECISION DIE SETS

THE TOOL ENGINEER

STURDIMATIC HEAVY DUTY

LIVE CENTERS

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AUTOMATICALLY COMPENSATED FOR
EXPANSION, SHOCK AND WEAR
ARE ACCURATE, DURABLE

WRITE FOR CATALOG AND FREE TRIAL OFFER

STURDIMATIC TOOL COMPANY

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DETROIT, MICH.

CERRO ALLOYS for Prompt Shipment

CERROMATRIX (Melting Temp., 250° F.) for securing punch and die parts, anchoring machine parts without expensive drive fits, for engraving machine models, stripper plates, chucks, short run forming dies and other metal-working applications.

CERROBEND (Melting Temp., 158° F.) Used as a filler in bending thin-walled tubing to small radii. Easily removed in boiling water. Also used for aircraft assembly jigs, templates for forming dies and other purposes.

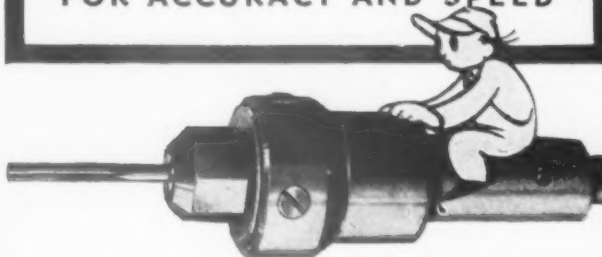
These two low-temperature-melting and expanding alloys are helping to speed up production of war materials for the Army, Navy and Air Force.

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40 WALL STREET - - NEW YORK, N. Y.

UNIVERSAL COLLET CHUCKS FOR ACCURACY AND SPEED



Universal floating collet chucks (above) are designed to operate horizontally in automatic screw machines and turret lathes. Adjustable spring pressure in 4 directions prevents dogtail motion and marred holes.



Universal standard collet chucks have ground threads, ample room for tool feed out and are ideal for holding end mills, keyway cutters, drills, etc. Nut fluted for Spanner wrench. Universal collet chucks grip as strong as solid steel itself. Write today for facts and prices.

UNIVERSAL ENGINEERING CO.
FRANKENMUTH • MICHIGAN

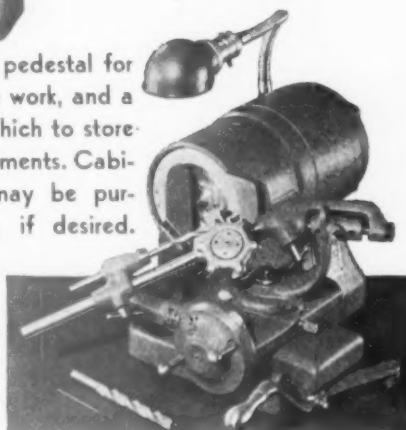
New Convenient Drill Grinding Combination

**Sellers No. 1G
Drill Grinder
with steel cabinet
pedestal**



A firm, substantial pedestal for the grinder and the work, and a handy cabinet in which to store supplies and attachments. Cabinet and grinder may be purchased separately, if desired.

The Sellers Model 1G Drill Grinder will grind drills from No. 70 (.028") to 1/2" and produces accurate drill points of 160 to 65 degrees included angle — perfect drill points with equal identical lips. Speeds production. Saves skilled labor for production machine work. Saves drills. Write for catalog and prices.



WILLIAM SELLERS & CO., INCORPORATED
1626 Hamilton St., Philadelphia, Pa.

Sellers

THE PASSING PARADE

The Ever-Changing Scene in Mass Manufacturing

ARTHUR A. BATTS has been elected President of the Carborundum Company. Mr. Batts, long associated with the Company, was its Secretary since 1927. Mr. Batts takes over the duties of the retiring President, **DR.**

FRANK J. TONE, who now will be Chairman of the Board of Directors.

CHARLES KNUPFER, formerly vice president in charge of sales and a member of the Board of Directors, was named as senior vice president and



will continue as head of the Sales Department.

C. D. MATHEWSON, formerly Chief Tool Engineer of the Spencer Lens Company, Buffalo, New York, has severed his connections with that company to become Manager and Chief Engineer in charge of the Buffalo office of the Duncan Tool Designing Company of Philadelphia.

ARCHIE E. SMITH has just been appointed Factory Manager of Plant No. 1 of the Curtiss-Wright Airplane Division in Buffalo. Mr. Smith began his affiliation with Curtiss-Wright in Buffalo in 1931. He was promoted to Factory Superintendent in 1939, after working in various manufacturing capacities.

ALLEN C. SIEGEL has been appointed General Superintendent in charge of all manufacturing at the Curtiss-Wright Airplane Division Plant No. 1 in Buffalo. While at Curtiss-Wright, Mr. Siegel was foreman of the die room, tool and die room, machine shop, later ass't. superintendent in charge of the machine shop, heat treat, welding and several fabrication departments.

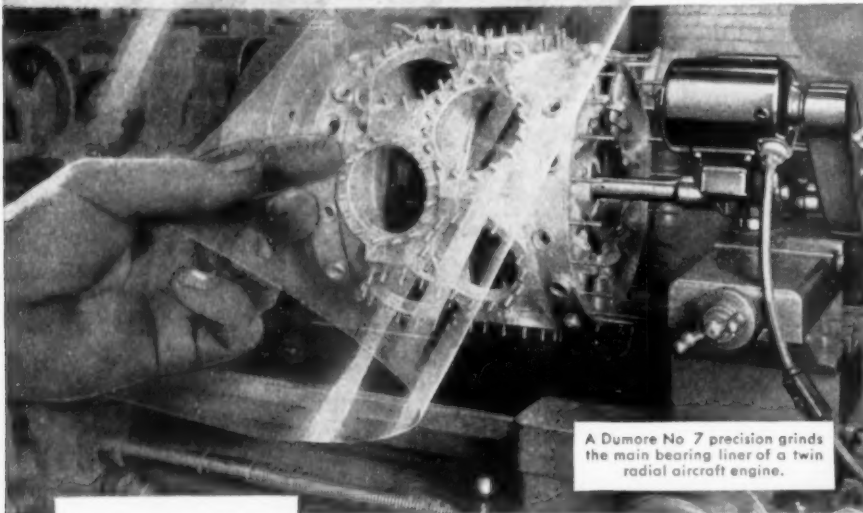
WALTER GEIST has just been elected President of the Allis-Chalmers Manufacturing Company. Mr. Geist will replace Mr. W. C. Buchanan, whose resignation was forced because of ill-health a few weeks ago. Mr. Geist has been with the Company since 1909.

ROBERT D. FRICK has been appointed General Manager of manufacturing operations for the United Wallpaper Factories, Inc., it has been announced. Mr. Frick comes to United from the St. Paul Foundry Co.

W. C. OSBORNE has just been appointed Superintendent of Outside Production for the Northrop Aircraft, Inc. Mr. Osborne has been production superintendent of the Murray Corporation of America at Detroit and the past three years has headed his own firm of industrial engineers in addition to conducting a school of methods engineering.

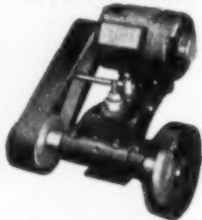
OTTO J. SCHLICHT has been appointed Superintendent of the Fabricating Division at the Curtiss-Wright in the Buffalo plant. Mr. Schlicht joined the Airplane Division of Curtiss-Wright in 1935. He has been a leadman, foreman, general foreman, and ass't. superintendent in the fabricating department.

1/12 the thickness of cellophane
YOU CAN GRIND THAT ACCURATELY WITH A DUMORE



A Dumore No. 7 precision grinds the main bearing liner of a twin radial aircraft engine.

A GRINDER AND SPEED FOR EVERY NEED



"The Chief" with 1 h.p. motor, is a powerful grinding unit built to tackle the biggest and heaviest work—internal or external.



All the advantages of Dumore precision grinding are offered by this low cost 1/5 h.p. No. 11 "Speedee".

Cut costs and increase accuracy in tool rooms and on production lines! Do precision grinding *the Dumore way*. Speed up equipment you now have . . . modernize old machinery. Mounted on lathes, planers, shapers, milling machines, or other machine tools, Dumore Grinders consistently make savings averaging up to 30% in labor, time, spoilage and overhead. Dumore's are engineered to grind to .0001" accuracy . . . whether on a delicate finishing operation, or on heavy tools and forming dies. Internal and external applications for a Dumore are endless. Get all the facts at once. Call your nearest Dumore Industrial Distributor today.

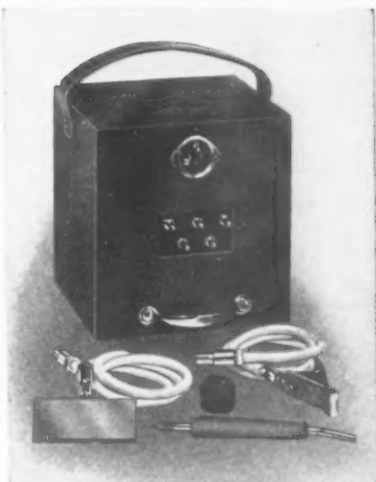


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Dumore PRECISION Grinders

Mark Iron,
Steel and
Carbides the
Etchograph
Way

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NEW JUNIOR MODEL

Buy the Original Electric Etcher

Three sizes to meet all requirements. Also a combined Etchograph and Demagnetizer.

With New ELKONITE TIP Pencil

Mark hardened parts, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides — quickly — plainly.

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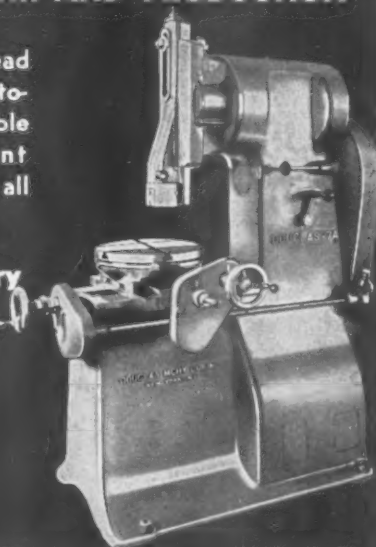
Douglas **PRECISION
SLOTTER**

FOR TOOLROOM AND PRODUCTION

Swiveling ram head and tool holder, automatic circular table and independent automatic feeds in all directions.

**Prompt Delivery
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Large-Scale
Production**

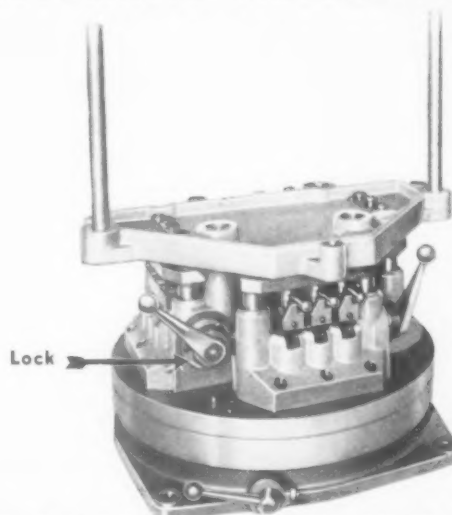
Built with
7", 8", 10"
Stroke



DOUGLAS MACHINERY CO., INC.

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SPECIFY SIEWEK
AUTOMATIC FIXTURE LOCKS



Why leading Tool Engineers specify SIEWEK automatic fixture locks:

1. Drive direct to the job.
2. Are a positive lock.
3. No back lash.
4. Will not release under chatter.
5. Can be used by either right or left hand.

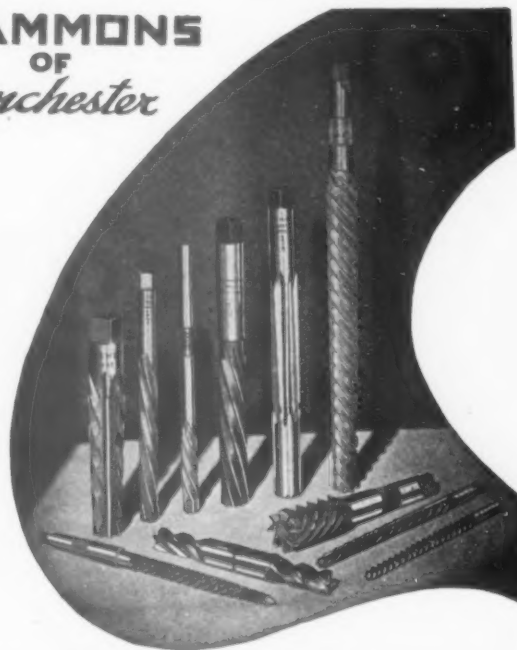
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SIEWEK TOOL COMPANY

Ferndale

Michigan

GAMMONS
OF
Manchester



PRODUCTION TOOLS

ORIGINATORS AND
MANUFACTURERS OF HELICAL
FLUTED TAPER PIN REAMERS

THE GAMMONS-HOAGLUND CO., MANCHESTER, CONN.

ALFRED KIRCHGESSNER has just been appointed General Foreman of the Machine Shop Department at Curtiss-Wright Airplane Division Plant in Buffalo. Mr. Kirchgessner came to Curtiss in 1927. This period of employment was interrupted to take a position with the Midwestern Tool Co. He then returned to Curtiss and resumed work in 1933.

JULES BEMB has just been assigned Ass't. Superintendent of Fabricating

Division of the Curtiss-Wright Aircraft Buffalo plant, New York. Mr. Bemb has been at the Curtiss-Wright Plant No. 1 since 1936.

GERALD Z. WOLLAM has just been appointed Works Manager of the new war production plant of the Westinghouse Electric and Manufacturing Company in Sunbury, Pa.

ARTHUR H. LOSEY is a recent addition to the staff of the Automatic Pol-



ARTHUR H. LOSEY
Joins Hammond Machinery Staff.

ishing and Buffing Division of the Hammond Machinery Builders, Incorporated, Kalamazoo, Michigan. For the past six years, Mr. Losey has associated with the J. C. Miller Co., Grand Rapids, as an engineer and advisor on all polishing and buffing problems.

ARTHUR H. SCHAUER has severed his connection with the Westinghouse Electric & Mfg. Company, Buffalo, New York, to accept a position on the sales and service force of the George Keller Machinery Company.

EDWARD NOE, formerly of the patent law firm of Marechal & Noe, has been made Secretary of the Sheffield Corporation.

JOHN P. BERNARD, vice-president and assistant general manager of The Sheffield Corporation, Dayton, Ohio, has been appointed a Director of that company.

W. R. KUHN has been appointed district manager of the Cleveland Office of Allegheny Ludlum Steel Corporation.

ALBERT H. GRAF, JR. has just been appointed as sales engineer in charge of the southern territory for the Ohio Crankshaft Company, Cleveland, Ohio.

HARKNESS W. CRAM, sales manager of the Aircraft Screw Products Company, Inc., New York City, has been elected vice-president in charge of sales.

FRED E. LACEY of Easton, Conn. has been elected President of The Lacey Manufacturing Co., Inc.

WALLACE K. BROWN has been appointed vice-president in charge of pro-

THE TOOL ENGINEER

"PUT IT ON THE BLANCHARD"



CHECK THESE ADVANTAGES OF BLANCHARD GRINDING

- ★ Production
- ★ Adaptability
- ★ Fixture Saving
- ★ Operation Saving
- ★ Material Saving
- ★ Fine Finish
- ★ Flatness
- ★ Close Limits
- ★ Especially valuable on jobs like the one illustrated.



Dies sharpened on the Blanchard No. 11 last longer — save you money



Tool makers - Die makers

CONSERVE YOUR TIME BY GRINDING JOBS LIKE THESE ON THE BLANCHARD No. 11

The cylinder wheel covers the entire surface at every revolution of the work. High work speed and ample supply of coolant eliminate any danger of heating the work. The Blanchard is a heavy and rigid machine, permitting the economical use of free, soft cutting wheels.

"Excellent — Fast — Accurate" says this customer after more than a year of tool room use.

Savings in time and money, and opportunities to release men from grinding to other work, make it logical to install Blanchard Grinders in every tool and die shop.

The **BLANCHARD**

MACHINE COMPANY

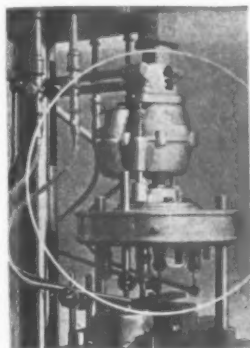
64 STATE STREET, CAMBRIDGE, MASS.

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.



Need higher TAPPING and DRILLING output?

Here's your answer!



Etico-Emrick INTERCHANGEABLE MULTIPLE HEADS

These tapping and drilling heads will turn any drill press into a high-speed, sensitive, *interchangeable* multiple tapping and drilling machine. Takes only a few minutes to mount them—without altering the press in any way. We can supply quill clamps to assure rigid mounting on any press. Heads are made entirely of *standard* parts adapted and assembled to meet specific requirements.

BULLETIN No. 3 gives full details including tap and drill capacities. Write for a copy today.

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OF *Etico-Emrick* DRILL CHUCKS • TAP CHUCKS
MULTIPLE TAPPING AND DRILLING HEADS
TAPPING ATTACHMENTS • TAPPING MACHINES

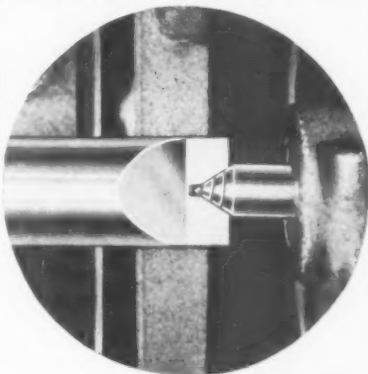
CMD — HELICAL GROOVE

CENTERS

When used with CMD Lathe Center Point Lubricants have an operating Ratio of from

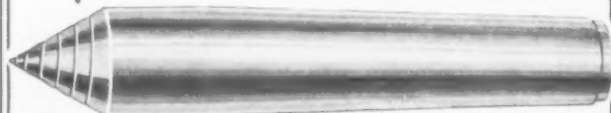
15 to 1

running time over the conventional type of centers



CMD Helical groove center expels heat from work caused by cutting tools — conveys center lubricant to extreme point of work and center—Lubricates entire bearing surface of work and center—No stopping of lathe to relubricate the center—No readjustment of tail stock necessary—No dripping or crushing out lubricant—Frictional heats reduced—Expansion of work kept at a minimum.

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OIL SAMPLE
and
BULLETIN
TODAY

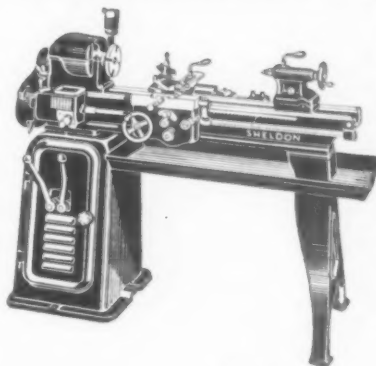


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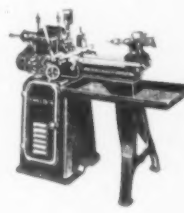
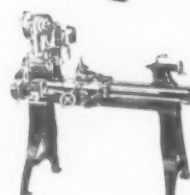
1943 W. 46th ST., CHICAGO, ILLINOIS

SHELDON Back Geared Screw Cutting PRECISION LATHES

For the Tool Room



The finest 10", 11" and 12" lathes ever built in the moderate price field. Large special analysis steel spindles GROUND ALL OVER, with extra collet capacity. Hand-scraped Bronze, Ultra-Precision Ball or Super Precision Roller spindle bearings. (The finest bearings obtainable). Heavy braced, semi-steel beds with hand scraped ways (2 V-ways and 2 flat ways). These lathes come with a choice of aprons, gear boxes, and drives including the anti-friction, 4-speed, V-belt Lever-operated pedestal base motor drive illustrated. Telescopic Taper Attachment and other accessories available.



For Production

Sheldon Lathes will stand up to any production work within their capacity—are ideal for second operation work. Production models available with any or all of these features: Ultra-Precision Ball or Super-Precision Roller spindle bearings. Lever-operated Collet Attachment, Lever-operated Tail Stock, Lever-operated cross slide with double tool post, Lever-operated turret, etc.

For Machine Shop

Both Bench and floor models with choice of Semi-quick or Full-quick Change Gears, Plain Aprons or Worm Feed Apron with Power Cross Feed. Overhead, Back or Underneath Motor Drives—Telescopic Taper Attachments, Tool Post Grinders, Milling attachments and all standard accessories.

Write for Catalog and name of nearest distributor.

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HARD Chromium

Is Enlisted for the Duration

"Everything in the Plating Line"

Hard and Bright
Chromium
Copper
Nickel
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★
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Pickling
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You, too, can help win the war by salvaging old tools with the newest and most efficient method. Your old worn taps, reamers, cutting tools, dies, plug gauges, arbors, etc. can be made better than new by our Hard Chromium Plate treatment. Our skilled engineers will show you how this fast economical method can be applied to your particular problems.

Our FREE BOOKLET, "The Story of Hard Chromium" (reading time 10 minutes) will tell you where to use hard chromium and what to expect from it.

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on ALL Your Plating Problems

RACINE PLATING CO., Inc.

Racine, Wisconsin

CHICAGO OFFICE—Willis Stutson, 184 N. Wacker Drive, RAN.-1605

M-B SUPER-SPEED
Pneumatic
GRINDER Model SS-SR



A
100,000
R.P.M.
UNIT
AMAZING
SPEED
and
POWER

The only hand grinder with spindle speed of 100,000 R. P. M. on 100 pounds air pressure. It has revolutionized hand grinder performance. Can be directed in any working position; operates with extreme ease. Steel construction throughout. Formed to fit the hand.

Also Other Models, and Air Line Filters and Automatic Air Line Lubricators. Write for Circular and Details of FREE TRIAL OFFER.

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You need this valuable book on ARC WELDING!

Gives all details on new Welding Materials, Equipment, Methods, Techniques and Procedures
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512 Illustrations

Here is a valuable new arc welding manual that will make your job easier... give you the latest facts on methods and procedures in arc welding. It's a complete book full of charts, diagrams, tables and the text is written in an easy-to-understand style by a practical arc welding man. It's a complete reference manual and textbook, all in one. You can't afford to be without it another day. 3 Day Examination at our risk. Only \$2.00 postpaid, or C. O. D. plus postage. HOBART BROS. Box TE-62 Troy, Ohio

HOBART
One of the World's Largest Builders of Arc Welders

PASSING PARADE

curement for the Crocker Wheeler Electric Manufacturing Company. Mr. Brown started with the Crocker Wheeler organization as an apprentice engineer in 1908.

H. E. DOUGHTY has been appointed assistant Sales Manager of the Jessop Steel Company, Washington, Pa. He was formerly district Manager at Philadelphia.

E. F. HOUGHTON & CO., of Philadelphia, has taken over the interest of the retail sales division of the Lubri-Zol Corporation of Cleveland, Ohio. The Houghton organization will henceforth manufacture, sell, and service Lubri-Zol lubricants.

Died

FRANKLIN G. HUBBARD, President of The Lacey Manufacturing Company, Inc., of Bridgeport, Conn. died on April 2.

OTTO H. SIEWEK, owner of the Siewek Tool & Engineering Company, which operates tool and die plants in Ferndale, Michigan; Richmond, Indiana; and Hartford, Connecticut; died May 5th at Harper Hospital in Detroit.

A pioneer in the cutting tool field. Mr. Siewek came to Detroit thirty years ago from Richmond, Indiana.

Sole owner of the Siewek Tool & Engineering Company, The Progressive Tool and Cutter Company, The Indiana Tool Company and the Siewek Tool company, Mr. Siewek was 59 year old.



OTTO H. SIEWEK
Cutting tool field pioneer.

GEORGE A. DECKER, a director of the Warner & Swasey Company, Cleveland, Ohio, and Works Engineer for twenty-five years before he retired in

A LaSalle Design

Tool Designing
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are used on—

- GEAR SHAPERS
- DRILL PRESSES
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- INTERNAL GRINDERS
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and are used for—

Grinding . . . Precision Boring
. . . Machining and other operations on Spur . . . Internal . . . Bevel . . . Cluster . . . Helical and Herringbone Gears.

GARRISON
MACHINE WORKS, INC.
DAYTON OHIO

Columbia TOOL STEEL

CONSERVATION—

Good cutting and forming tools conserve material and increase war production.

Let Columbia men help you conserve with recommendations for making the most out of your tools.

*It pays to use
Good Tool Steel.*

COLUMBIA TOOL STEEL COMPANY

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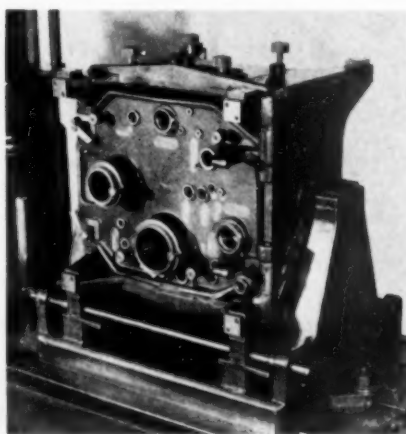


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The Crib

(Continued from page 168)

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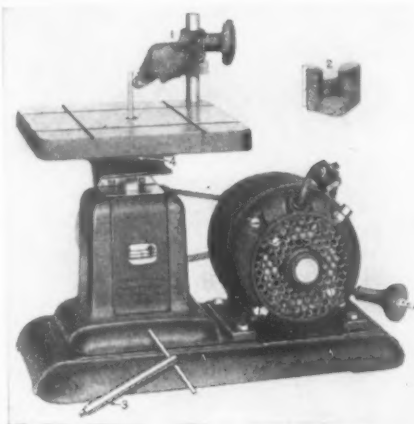


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2	1 1/2	3 1/4	6
3	1 3/4	3 1/4	7 1/2
4	2	3 1/2	10
5	2 1/4	4 1/4	21
6	2 3/4	4 3/4	23
Loaded Mallets			
7	1 1/4	3	8
8	1 1/2	3 1/4	12
9	1 3/4	3 1/4	16
10	2	3 1/2	20
11	2 1/4	4 1/4	42

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DETROIT — June 11. Huyler's Concourse Dining Room in the Fisher Building. Main speaker will be from the Iron and Steel Branch of the WPB. His talk will be, "Substitute Steels for Cutting Tools, Jigs, and Fixtures." Mr. C. Way from Warner & Swasey will show a sound movie entitled, "Chips". A second movie will be shown by Mr. Ellis and Mr. Pfeffer of the Allis Chalmers Manufacturing Company.

MILWAUKEE — June 6. Dinner meeting at the Astor Hotel. This meeting is for members and their wives and there will be dancing. Mr. Otto Winter, national president, will be the speaker. Also on the program will be a movie entitled, "Building a Bomber".

PITTSBURGH—June 5. Dinner 6:30 P.M. Technical Meeting 8:00 P.M. This meeting will be held at McCann's Restaurant, Diamond and Ferry Streets. The speaker will be Mr. D. H. West of the LaPoint Machine Tool Company. His subject will be, "Broaching Machines and Tools".

ROCHESTER — June 20. 2 P.M. This will be a picnic at Point Pleasant. Reservations: Charlie Seeley.

SPRINGFIELD — June 6. This will be the second annual clam bake of the Springfield Chapter and will be held at Turner Park, East Longmeadow. This will take the place of the June meeting.

WILLIAMSPORT — June 8. First Evangelical Church. Dinner at 6:30 P.M. and the technical session at 8:00 P.M. This will be the last meeting for the summer months. Speaker of the evening will be Mr. Frank Curtis, chief engineer of the Van Norman Machine Tool Company. His subject will be, "Tool Engineering."

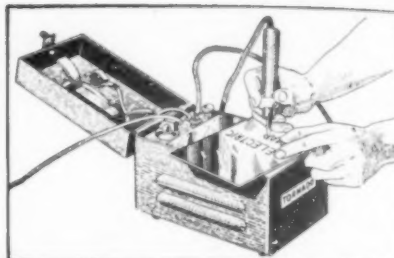
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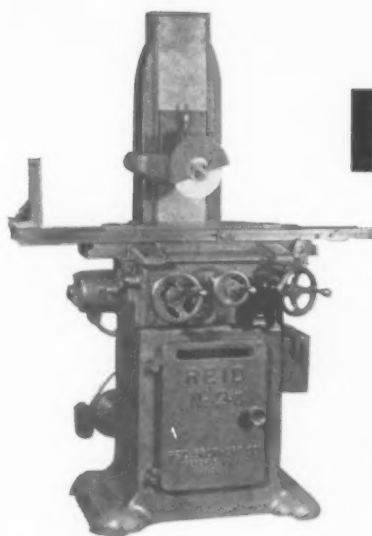
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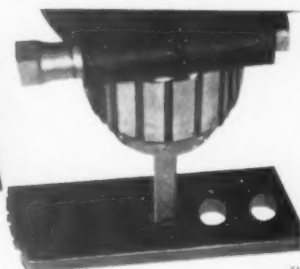
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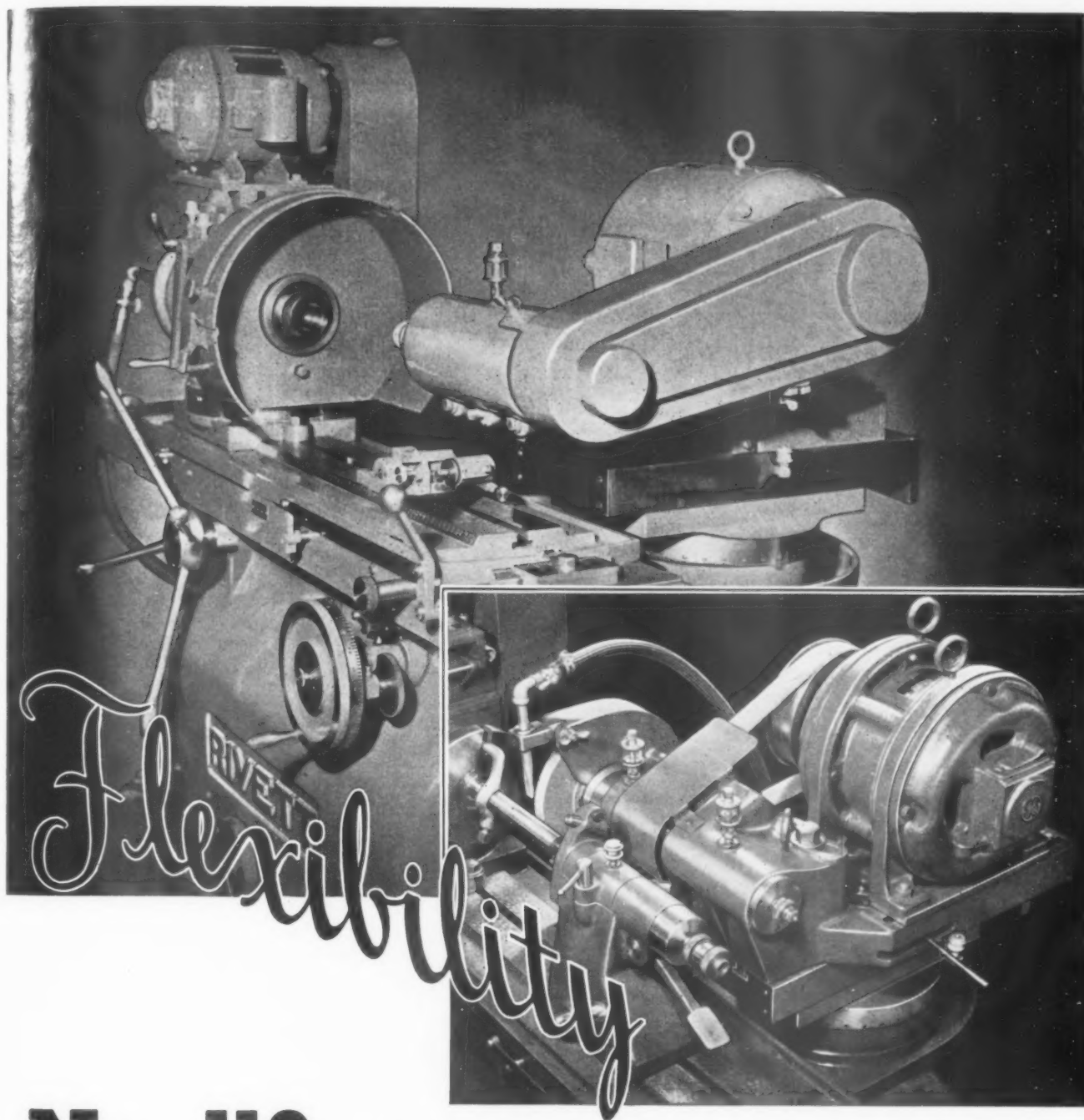
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